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ABSTRACT

This volume on Phase II of the New York State Educational Information System (NYSEIS) describes the Gross Systems Analysis and Design, which includes the general flow diagram and processing chart for each of the student, personnel, and financial subsystems. Volume II, Functional Specifications, includes input/output requirements and file specifications necessary to support the systems design. Detailed systems design and programing is currently underway as Phase III. The NYSEIS system is designed to provide a complete range of information and data processing services to school districts in New York State. The report concludes that regionalization is the solution to the problem of providing comprehensive computer services to school districts. (JF)

N-56

The New York State Education Department
and
The Albany-Schoharie-Schenectady
Board of Cooperative
Educational Service

ED0 43941

New York State
Educational Information System
(NYSEIS)
Systems Design,
Prepared by
Price Waterhouse & Co.
July 1969

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STANLEY L. RAUB
ASSOCIATE COMMISSIONER FOR
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November 12, 1969

EDO 43941

MEMORANDUM TO: To Whom It May Concern

FROM: Stanley L. Raub

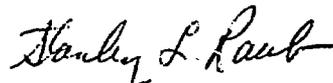
SUBJECT: New York State Educational Information System Report

This is Volume I of the New York State Educational Information System, Phase II final report, prepared by Price Waterhouse and Co. This report, which has been approved in principle by the Statewide Steering Committee, is serving as the working document for Phase III, detail design and programming. Volume I, the Systems Design, includes the general flow diagram and the processing chart for each of the student, personnel and financial subsystems. Volume II, the Functional Specifications, includes the input/output requirements and file specifications necessary to support the Systems Design, as well as serve as a reference document for those charged with the technical implementation of the system and is available by special request. We believe these documents comprise the most comprehensive report in the literature today describing school district data processing needs.

Phase I of the NYSEIS program, which was completed in November 1967 by the System Development Corporation, provided the conceptualization for the regional network. Phase II, the Gross Systems Analysis and Design, was completed in September of this year by Price, Waterhouse and Co. Phase III, currently underway, involves the detailed system design and programming. Phase IV, the implementation of one or more regional centers, will follow upon the completion of Phase III.

We firmly believe that regionalization is the solution to the problem of providing comprehensive computer services to school districts and that the current philosophy of design will provide a sound and effective basis for these services.

Sincerely yours,



Stanley L. Raub

PRICE WATERHOUSE & CO.

60 BROAD STREET

NEW YORK 10004

September 30, 1969

Mr. Richard C. Lesser
Statewide Coordinator, New York State
Educational Information System
State Education Building
Albany, New York 12224

Dear Mr. Lesser:

We are pleased to submit 1) the attached report which presents the system design we have developed for the New York State Educational Information System (NYSEIS) and 2) the accompanying volume which presents the detailed functional specifications which served as the basis for system design.

The NYSEIS system is designed to provide a broad range of data processing and information services to the school districts of the State of New York through a network of regional service centers. The overall system consists of four basic subsystems, a student subsystem, a personnel subsystem, a financial subsystem and a facilities subsystem, each designed to provide a range of services within these functional areas.

The functional requirements to be met by the NYSEIS system were established by surveying some twenty school districts and Boards of Cooperative Educational Services (BOCES) throughout the State. These were selected to include districts which are representative of the widely varying requirements of the more than 750 districts in the State. The functional requirements for each of the four subsystems which were established as a result of this survey were reviewed by educational data processing specialists throughout the State before adoption as the basis for system design.

The system design effort which followed the establishment of functional requirements was aimed at selecting from among the wide range of available alternatives, the most suitable processing methods, file structures, data collection and input techniques, and basic computer equipment configuration. System designs were developed for the student, personnel, and financial subsystems at a level of detail suitable for use in the implementation work to follow. Design work on the facilities subsystem was deferred by mutual agreement pending further clarification of certain requirements and potential benefits.

Throughout the study we have been fortunate in having the full cooperation and assistance of many individuals in all parts of the State representing various school districts, BOCES, and the New

Mr. Richard C. Lesser
Statewide Coordinator, New York State
Educational Information System

September 30, 1969

York State Education Department. Working relationships among participants in the effort have been excellent and productive and the resulting reports are truly the product of all who participated.

We wish to express our gratitude for all of the assistance and cooperation we received during the course of the study and we look forward to the day when the NYSEIS system will be in full operation serving school districts throughout the State.

Yours very truly,

Price Waterhouse & Co.

NEW YORK STATE
EDUCATIONAL INFORMATION SYSTEM
(NYSEIS)

SYSTEM DESIGN

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I. INTRODUCTION

A. Statement of objectives

The basic objectives of this project were set forth in the request for proposals and other documents that it cited. In essence the objectives were to produce:

- an overall system design for a New York State Educational Information System (NYSEIS) which is to provide a complete range of information and data processing services to school districts in the State of New York.
- a set of systems specifications for NYSEIS which are to be used as a basis for obtaining equipment proposals from computer manufacturers.

A fundamental objective of the NYSEIS system is that it have general applicability to the more than 750 operating school districts in the State of New York. The system should provide as high a degree of standardization as is compatible with the needs of the various school districts. To accommodate truly different requirements among the various school districts it should provide optional features so as to be readily adaptable to meet the needs of school districts throughout the state.

B. Scope of work

The NYSEIS system consists of three basic subsystems encompassing the functions listed below:

Student Subsystem

- Census
- Enrollment
- Attendance
- Grade Reporting
- Permanent Records
- Test Scoring and Analysis
- Student Scheduling

Personnel Subsystem

- Payroll
- Personnel Records
- Staff Directories
- Retirement
- Professional Qualifications

Financial Subsystem

- Budget Preparation
- Encumbrance Accounting
- Accounts Payable
- General/Revenue Ledger

Initial planning included a fourth subsystem, namely, the "Facilities Subsystem" consisting of the following applications:

Inventory Control	Transportation
Construction Requirements	Library & Textbook Accounting
Maintenance	Cafeteria Accounting

During the course of the analysis phase of the project it was decided that further development of the Facilities Subsystem would be postponed until a future date. Section V will contain a preliminary statement of the functional requirements of the Facilities Subsystem.

In accordance with the request for proposals the following have been developed and documented:

1. gross flow charts for each of the three subsystems indicating the interrelationships of each application in the subsystem.
2. integrated gross flow diagrams for the entire system demonstrating the interrelationship of information flow through each subsystem and the overall system.
3. preliminary master file formats to serve as information data base for all activities in each subsystem.
4. preliminary input formats and output formats to support information processing requirements.
5. a master operations calendar, the purpose of which is to indicate the major activity periods during the processing year.
6. a specifications document which will enable computer manufacturers to submit a configuration which will support the processing outlined by the gross systems design.

II. ANALYSIS OF REQUIREMENTS

A. Approach to project

Development of NYSEIS is viewed as basically a systems engineering project involving, first, a careful analysis and determination of what the system must do and, secondly, the design of how the system will operate.

The project team focused its efforts initially on the analysis of specific information needs of school districts and the State Education Department. Anticipated future needs as well as present needs were studied and emphasis was placed upon the task of defining and analyzing differences in requirements among school districts. On the basis of this study of common and differing needs, the services to be provided by NYSEIS, the end products to be produced and the input required were defined. As a result, a set of Functional Specifications for NYSEIS was developed and used as a starting point for the systems design effort. These Functional Specifications were reviewed with representatives of the State Education Department, Boards of Cooperative Educational Services and the Division of Educational Management Services to make certain that the requirements outlined in the specifications represented a sound basis for systems designs.

After the Functional Specifications were agreed upon, attention was turned to the technical matter of system design. The emphasis at this point was shifted from what the system should accomplish to how the system should accomplish it. Primary consideration was given to the design of files for use in the development of a comprehensive information data base to support the three subsystems. Once the data base was designed it was reviewed by representatives of the BOCES to make certain that it represented a sound information base.

Next, attention was turned to the design of application processing within subsystem and the interface between applications within subsystem. The flow charts in Section IV of this report represent the result of the system design and have been reviewed with several directors of BOCES and representatives of the State Education Department.

B. Survey of

1. School districts and BOCES

The study team, in cooperation with members of the State Department of Education, completed the data gathering phase of the survey in the school districts and BOCES. Those visited included:

School districts

Irvington
South Huntington
Buffalo
Williamsville
Great Neck
East Meadow
Schenectady
Bethlehem
Farmingdale

Sewanhaka
North Tonawanda
Kenmore
East Greenbush
South Colonie
Rochester
New Paltz
Vincentian Institute

BOCES

Westchester I & II
Nassau
Albany-Schenectady-Schoharie
Ontario-Seneca-Yates

Suffolk II & III
Erie I
Rockland

During the survey, detailed analysis was made of the manual and automated record systems now in use in school districts and Boards of Cooperative Educational Services.

At that time the study team met with local school district representatives and gathered information concerning (1) source documents, their format and content, (2) processing procedures and methods, both mechanized and manual, and (3) output documents and reports produced, including content and format. The views of district officials as to anticipated future requirements and data needs of the school districts and personnel were also obtained.

The applications and functions surveyed included the Student Subsystem, Personnel Subsystem, Financial Subsystem, and Facilities Subsystem.

Identification of the common requirements of the 16 school districts and the special requirements of particular types of districts with respect to the student, personnel, financial and facilities subsystems was also made.

Lastly, each application was analyzed to determine the probable extent to which standardization of inputs and outputs would be feasible and acceptable to the local school districts.

2. State Education Department

Our survey of the State Education Department started with assembling and analyzing all records and reports concerning school district operations required by the State Education Department. Next an analysis was made of the manual and mechanical processing performed by State Education Department on information and reports submitted by school districts, to identify opportunities for preprocessing at regional centers. The State Education Department officials outlined their views concerning probable future requirements for information and analyses relating to the school districts.

3. Systems in other states

During the course of this project, information was assembled on the characteristics of systems in several other states which have made significant progress in developing Educational Information Systems and regional services.

In recent months, a visit was made to the State of Oregon to review the OTIS project which represents a state-wide centralized approach to cooperative data processing services with all school districts communicating with the system via remote terminal.

During a previous engagement a visit was made to California to survey the results of regionalization in that state. The data processing effort of the Chicago Board of Education's goal of a Total Information System was also reviewed. In addition, a comprehensive state-wide analysis was also made of the present posture of administrative data processing efforts in Maryland public schools.

III. OBJECTIVES AND CONSIDERATIONS IN
THE DEVELOPMENT OF NYSEIS

Fundamental objectives and functional requirements of NYSEIS have been developed, based on the following:

1. Survey and evaluation of the current status of data processing in sixteen school districts.
2. Survey and evaluation of current data processing activities at seven BOCES serving several hundred school districts.
3. Meetings and discussions with the Division of Educational Management Services.
4. Discussions with representatives of other offices of the New York State Education Department.
5. Meetings with other New York State Agencies.
6. Evaluation of information obtained about similar efforts in other states. The information has been acquired from field investigation and from sources available to the general public.
7. Study and evaluation of information available from the previous phase (Phase I) of the NYSEIS developmental plan.
8. Study Team experience in similar undertakings in educational and noneducational environments.

Five principal objectives were identified as a basis for system design. These are set forth below with comments relating to each. These objectives represent the foundation for the design and implementation of effective regional data processing support to school district administration.

Objective 1. The regional center must have the capability to support multiple districts of varying size and requirements.

Objective 2. Uniform systems must be developed in support of regional data processing services; however, allowances must be made for a certain amount of local school district flexibility.

Objective 3. The responsibility for processing and operational control must be vested in the regional center. Validity and control of administrative data must be the responsibility of the local unit. Adherence to both regulations should be coordinated through cooperative effort.

Objective 4. Modularity of systems design should be achieved so that regional center processing can be effectively used by school districts of varying sizes. This means that a district with a few schools and a small student population should have the opportunity to avail itself of the same services and support required by districts having many schools and a large student body.

Objective 5. Construct an information data base which will effectively assist in the administration of student personnel and financial programs at the school district level today and in the future. Current requirements do not indicate that immediate retrieval or interrogation of student and/or personnel or financial information is necessary. This does not mean that future requirements will not call for remote interrogation capabilities. Therefore, files should be designed with this possibility in mind.

Current requirements do not dictate the need for "real-time" processing of normal daily transaction data. Therefore, "batch" processing will be a standard method of file maintenance and report preparation until such time as other effective and economical "real-time" methods are available and deemed necessary.

VI. DESCRIPTION OF NYSEIS

A. Introduction

This section contains a general flow diagram and the processing flow charts for each of the Student, Personnel and Financial subsystems.

The general flow diagrams depict the interrelationships of the applications and files in each subsystem. The processing flow charts show the specific runs within each application including files, program functions, inputs and outputs.

The flow diagrams proceed from top to bottom. The processing symbols contain the program name, the run number and a brief description of the functions the program is to perform. Each run, including sorts, is numbered within each subsystem. These run numbers are used in the operations calendars in Section V.

Of special note is the use of the offline storage symbol. This symbol indicates the source and disposition of the major files. For instance, on page IV-24, the Enrollment file and the Course Master are shown coming from the file library. After being read by Program S-34, the Course Master is returned to the library. The Enrollment file is used again before being returned.

All subsystems show print output being written on files for printing in a spooling mode or off-line on a satellite system. The subsystems further use a technique of report generation that permits reports in different sequences to be drawn from a master file in the same pass. This technique is based upon a program called Report Writer. Report data are drawn from the master file in line-image form or as raw data. Control records that describe the input and the desired reports are also written. The report file is sorted into the desired sequences on a sort key. Report Writer analyzes the control records and prints the reports, inserting headings and taking totals.

This technique has two major advantages:

1. When reporting requirements change, a new report may be generated by simply changing the control records.
2. Report Writer provides the means of drawing reports from a file in difference sequences, some of which may be in a different sequence than the file. Whenever totals and headings are required, this technique saves sorting the master file for each report. Instead, only the report file is sorted.

SYSTEM FLOWCHART SYMBOLS



PROCESSING

A major processing function performed by a computer program.



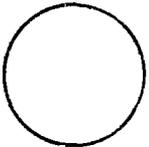
DOCUMENT

Paper documents and reports of all varieties



PUNCHED CARD

All varieties of punched cards.



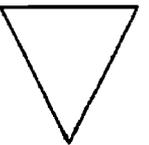
MAGNETIC TAPE

Used to indicate files residing on magnetic tape.



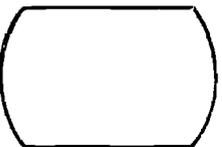
DIRECT ACCESS DEVICE

Used to indicate files residing on direct access devices such as disks and drums.



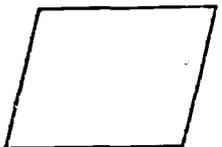
OFFLINE STORAGE

Used to indicate the source and disposition of major files in the system.



KEYING OPERATION

An operation utilizing a key-driven device.



CLERICAL OPERATION

A manual offline operation not requiring mechanical aid.



CONNECTOR

An entry from, or an exit to another part of the flowchart.



OFFPAGE CONNECTOR

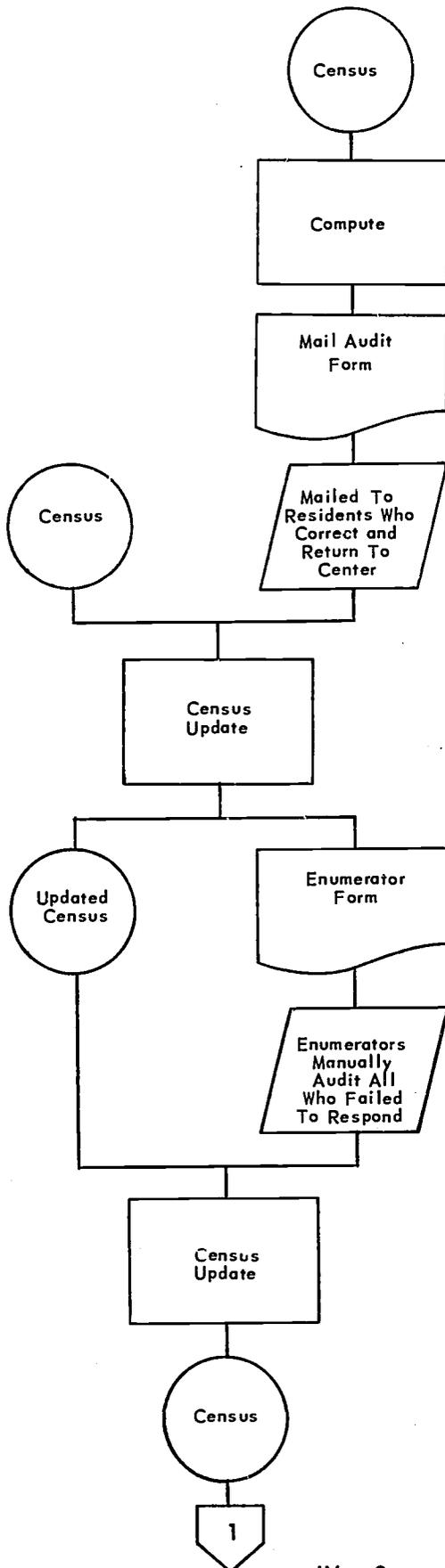
A connector used instead of the connector symbol to designate entry to or exit from a page of the flowchart.

B. The System

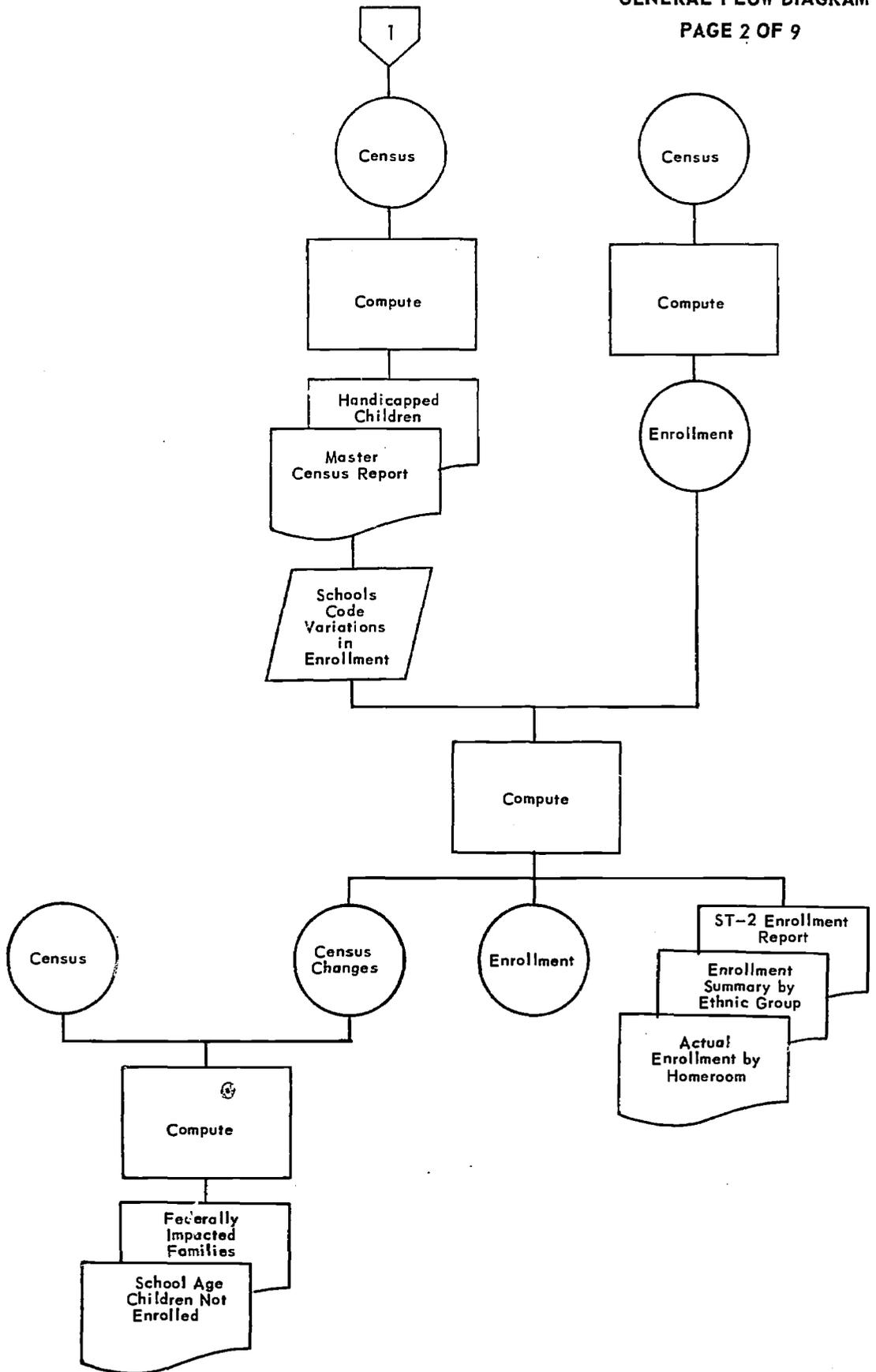
1. Student Subsystem

- General Flow Diagram
- Processing Flow Charts

NYSEIS
STUDENT SUBSYSTEM
GENERAL FLOW DIAGRAM
PAGE 1 OF 9

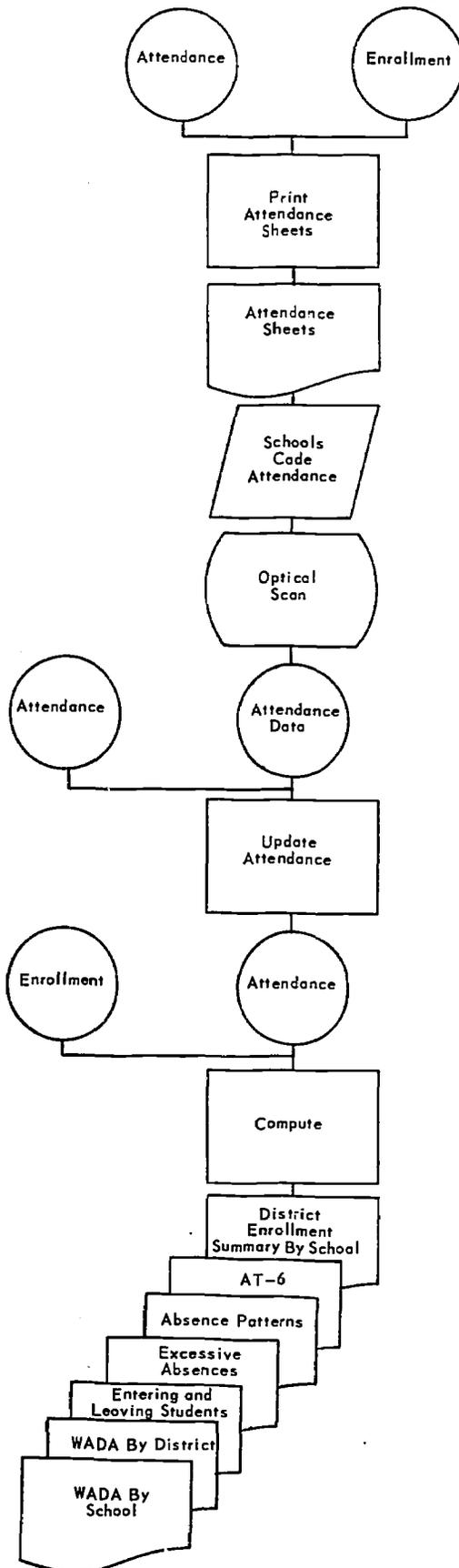
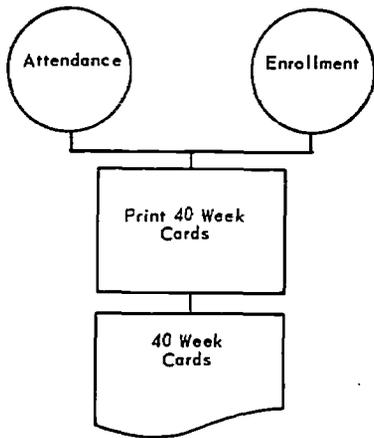


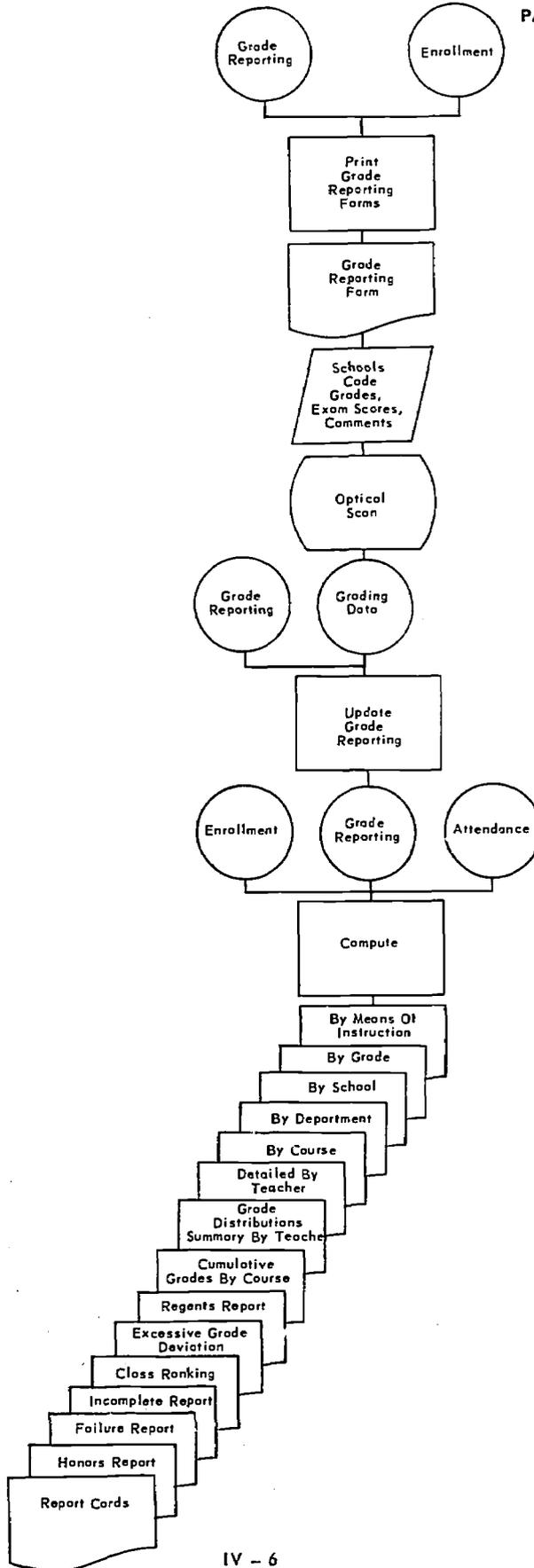
NYSEIS
STUDENT SUBSYSTEM
GENERAL FLOW DIAGRAM
PAGE 2 OF 9

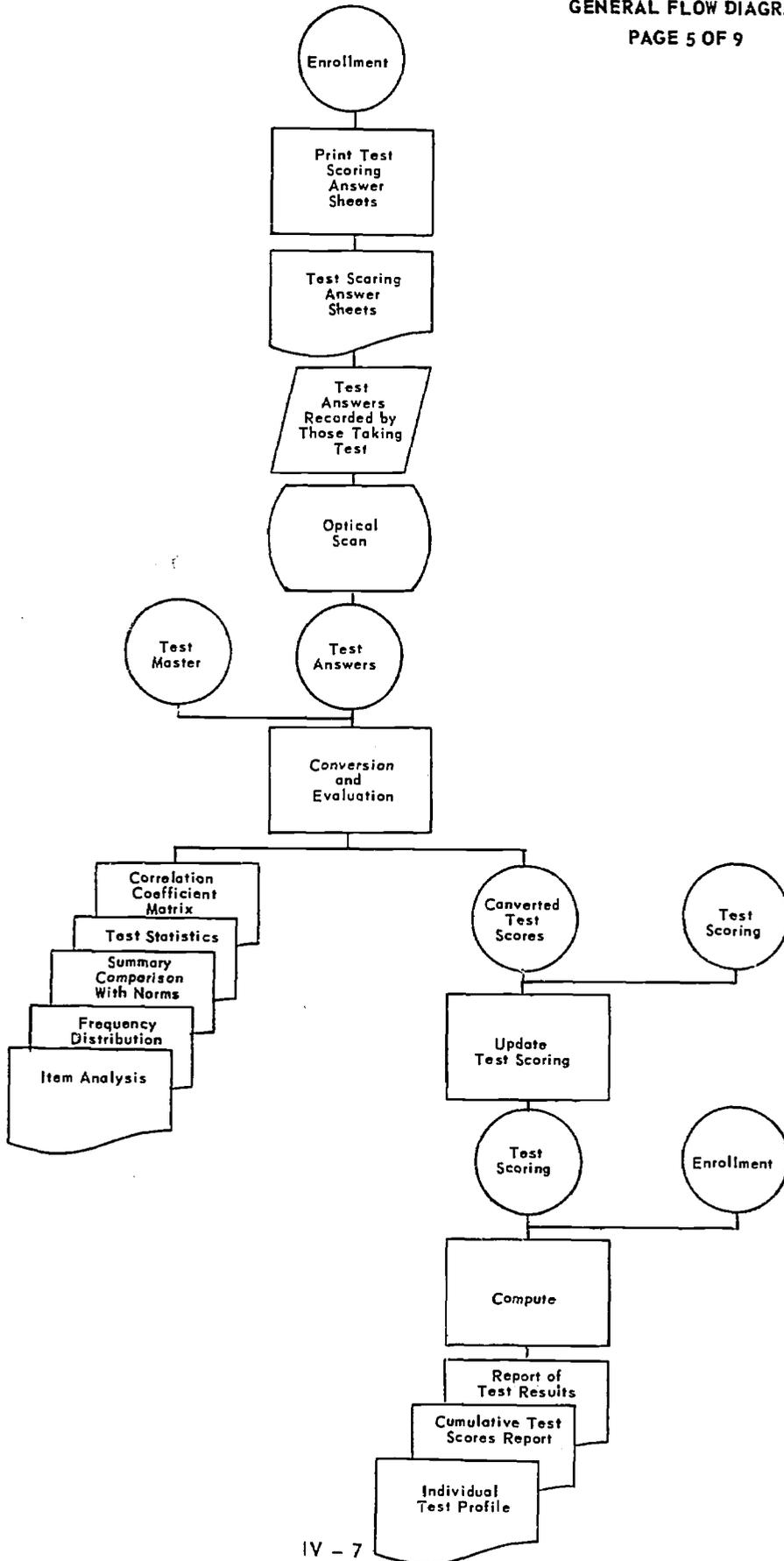


NYSEIS
STUDENT SUBSYSTEM
GENERAL FLOW DIAGRAM

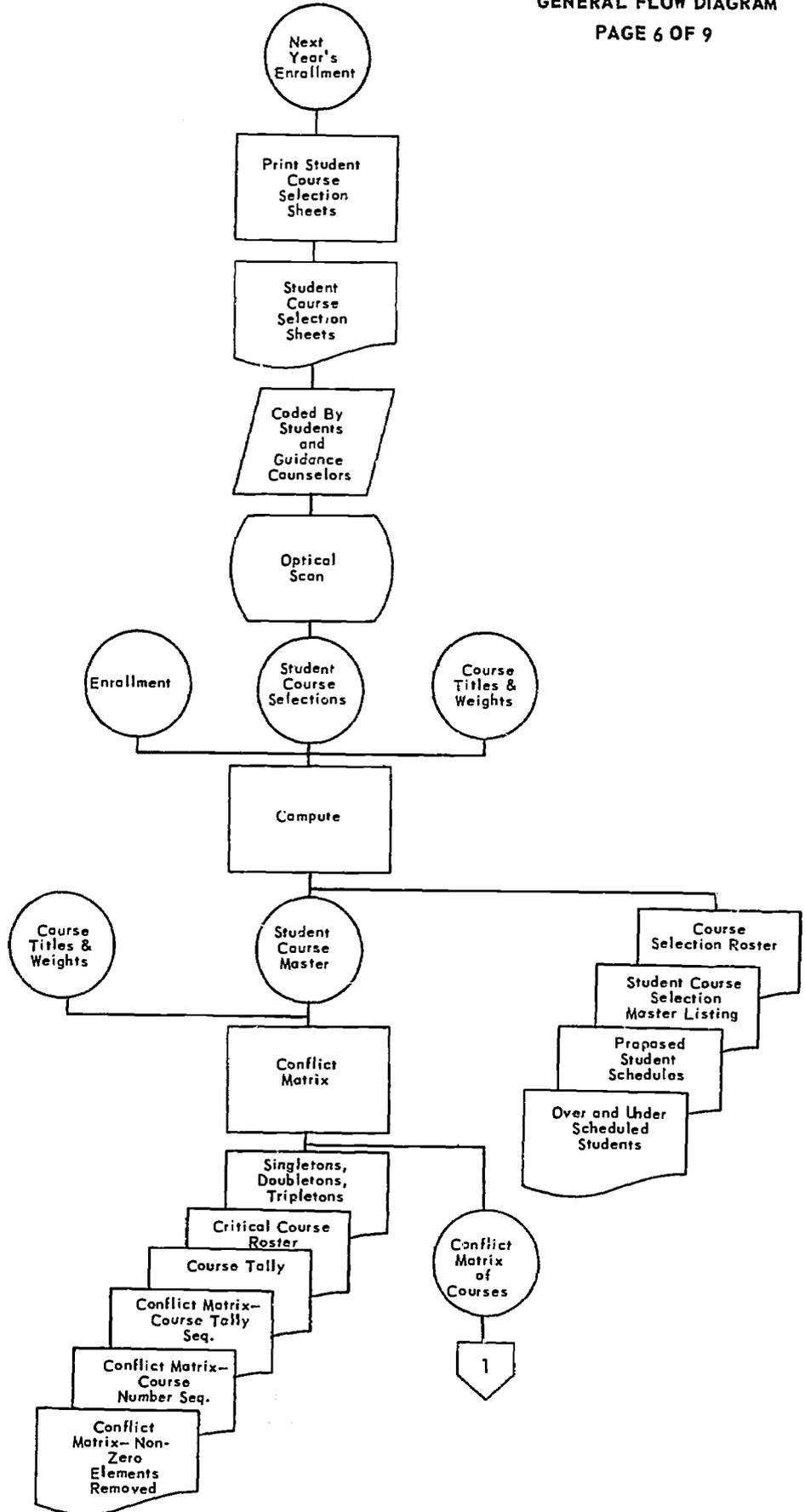
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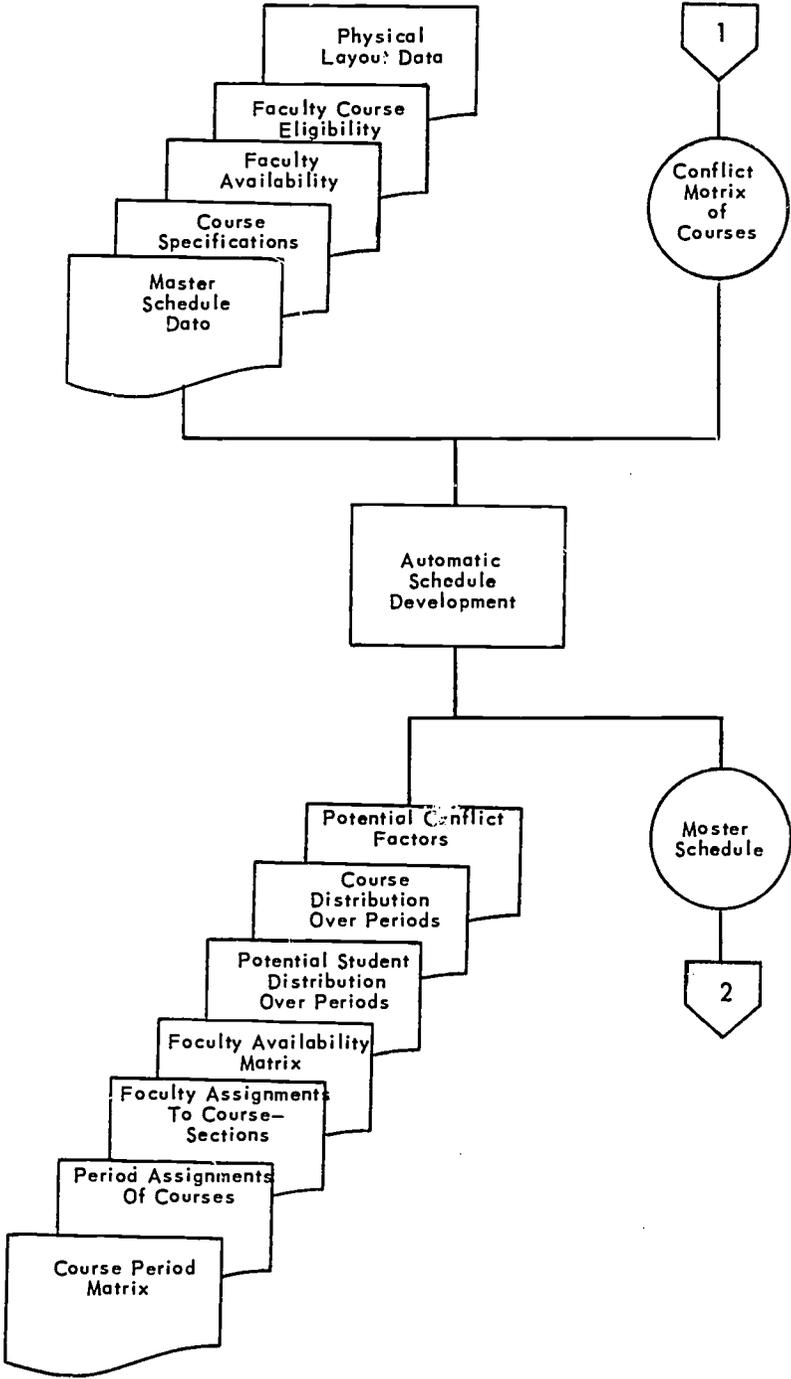


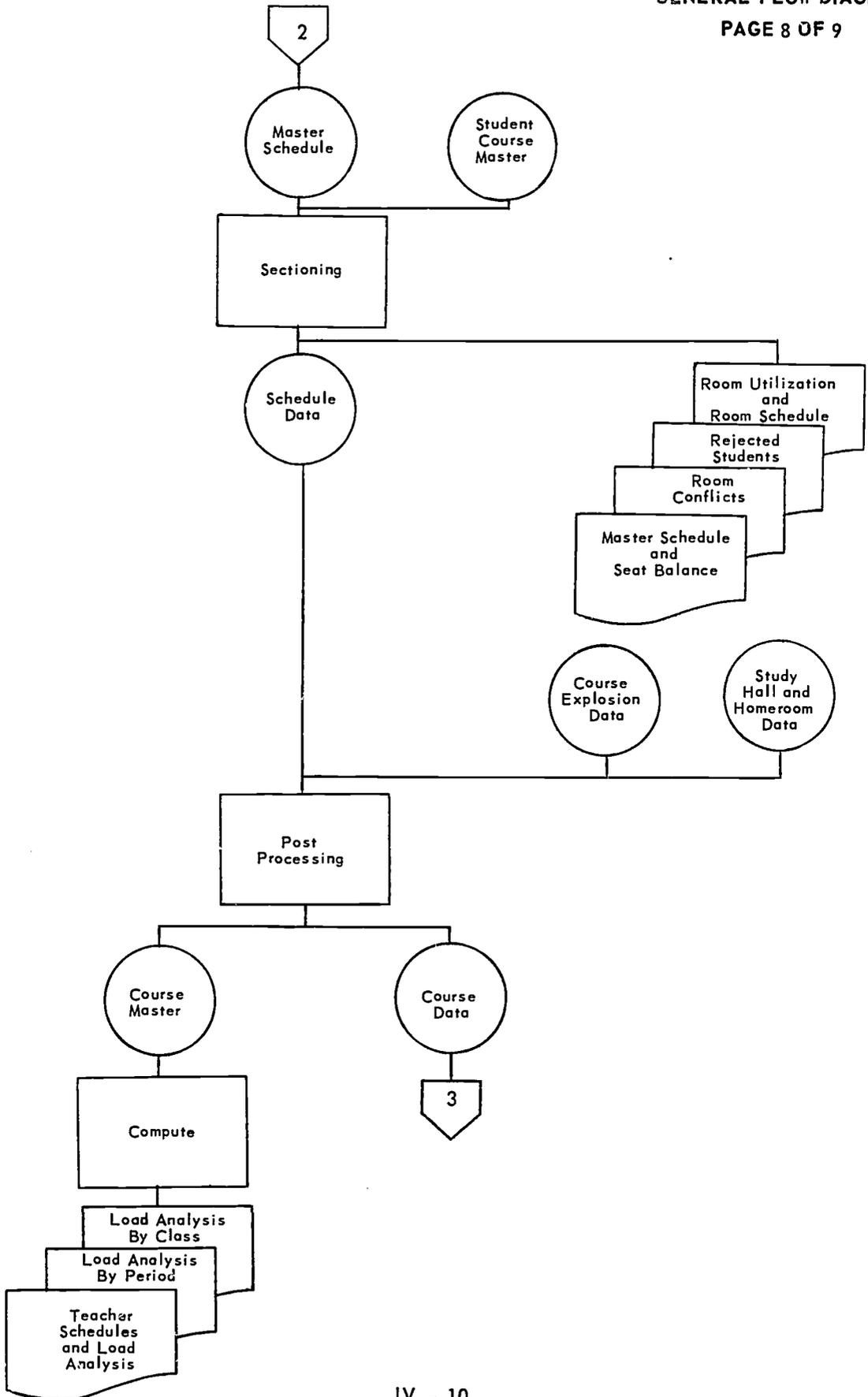


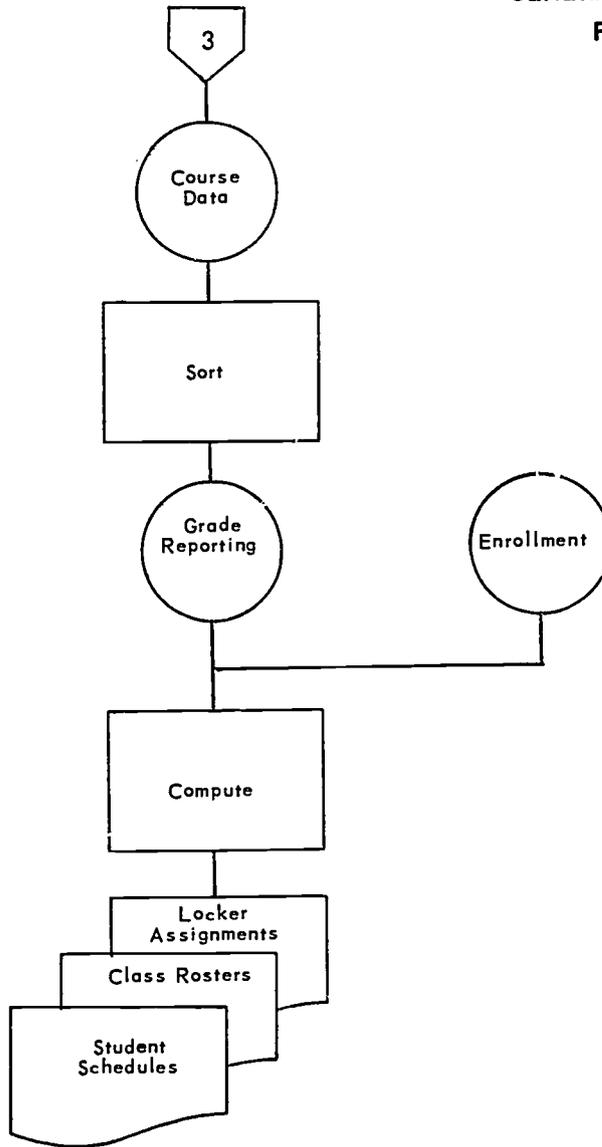
NYSEIS
STUDENT SUBSYSTEM
GENERAL FLOW DIAGRAM
PAGE 6 OF 9

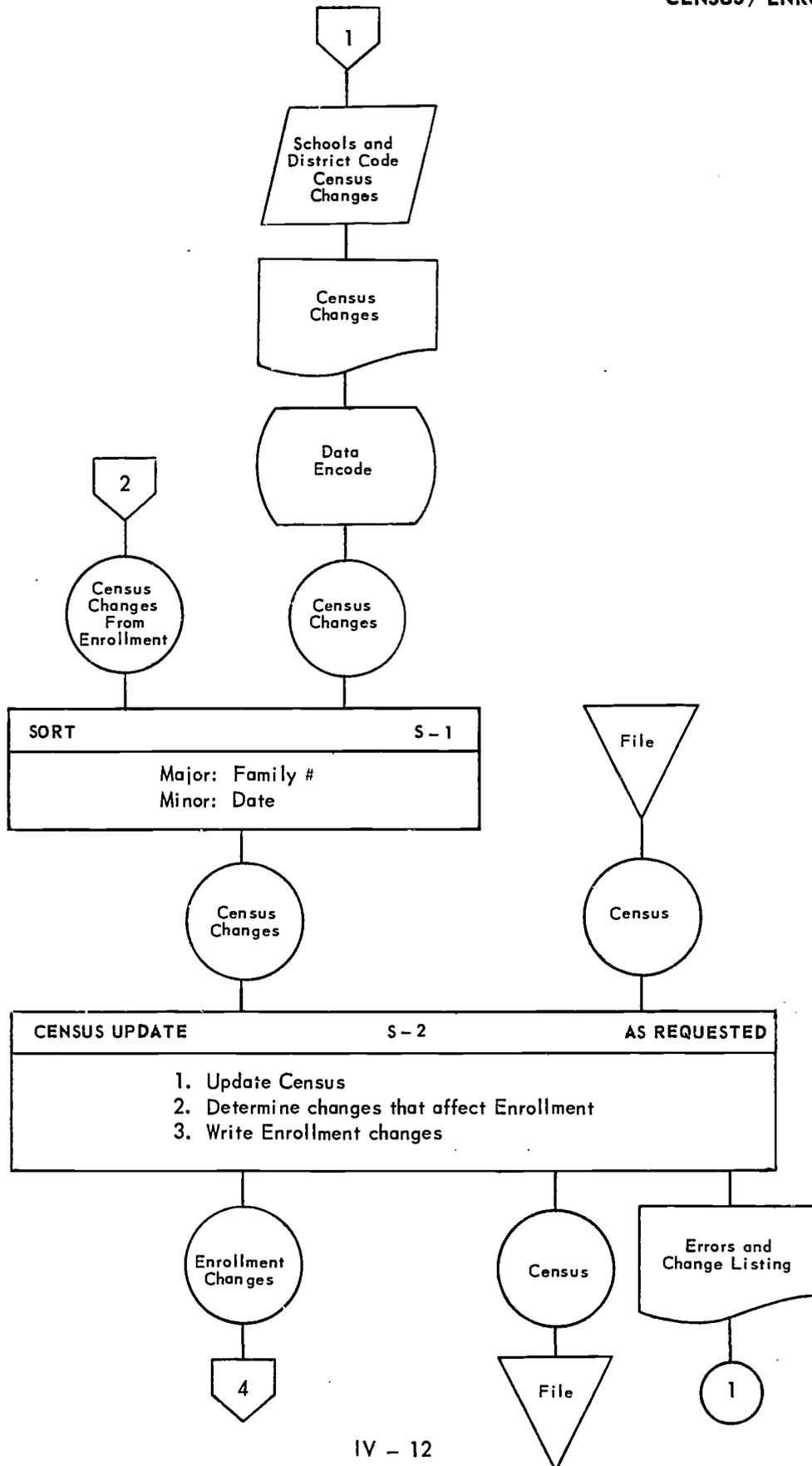


NYSEIS
STUDENT SUBSYSTEM
GENERAL FLOW DIAGRAM

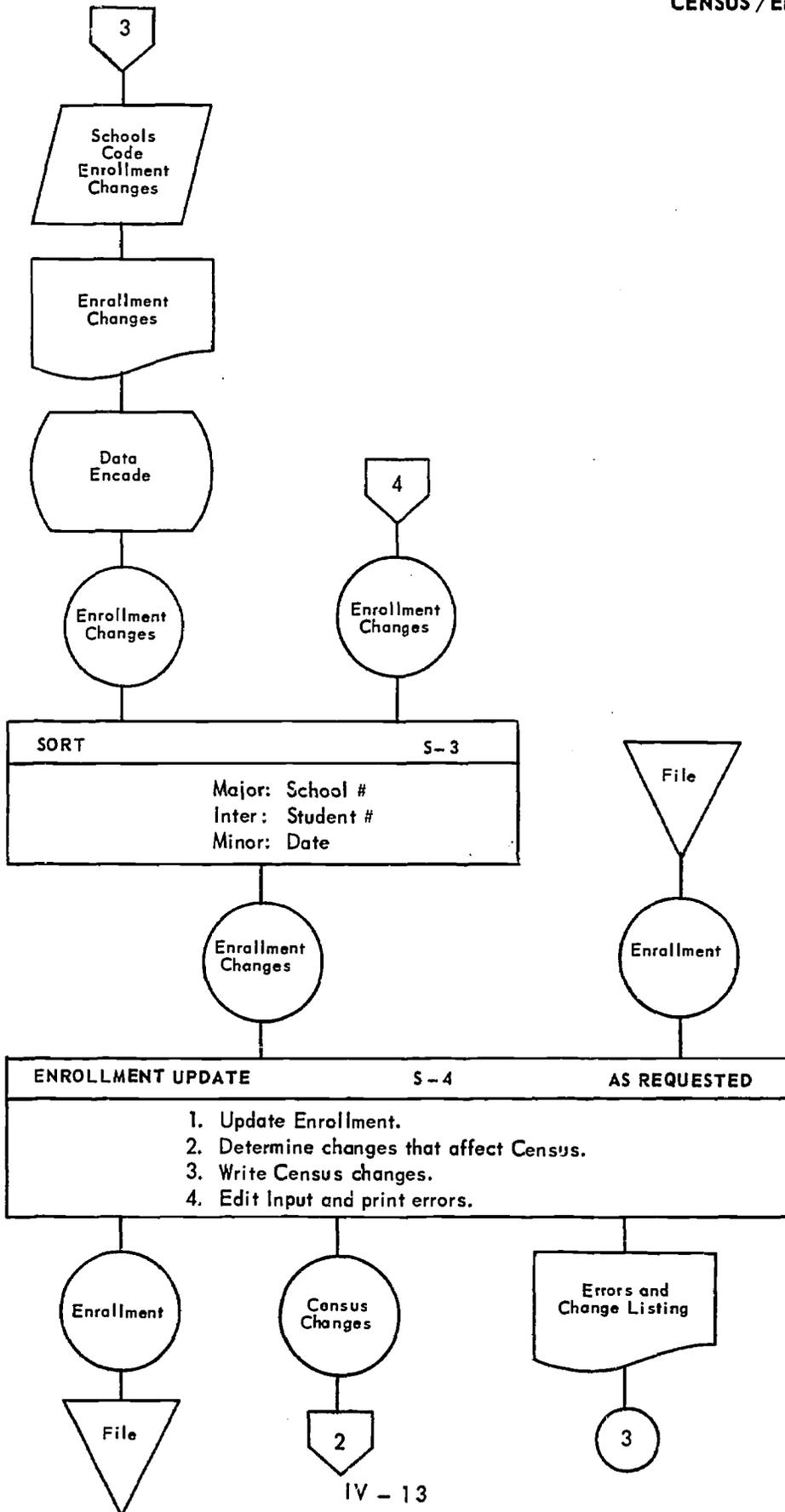




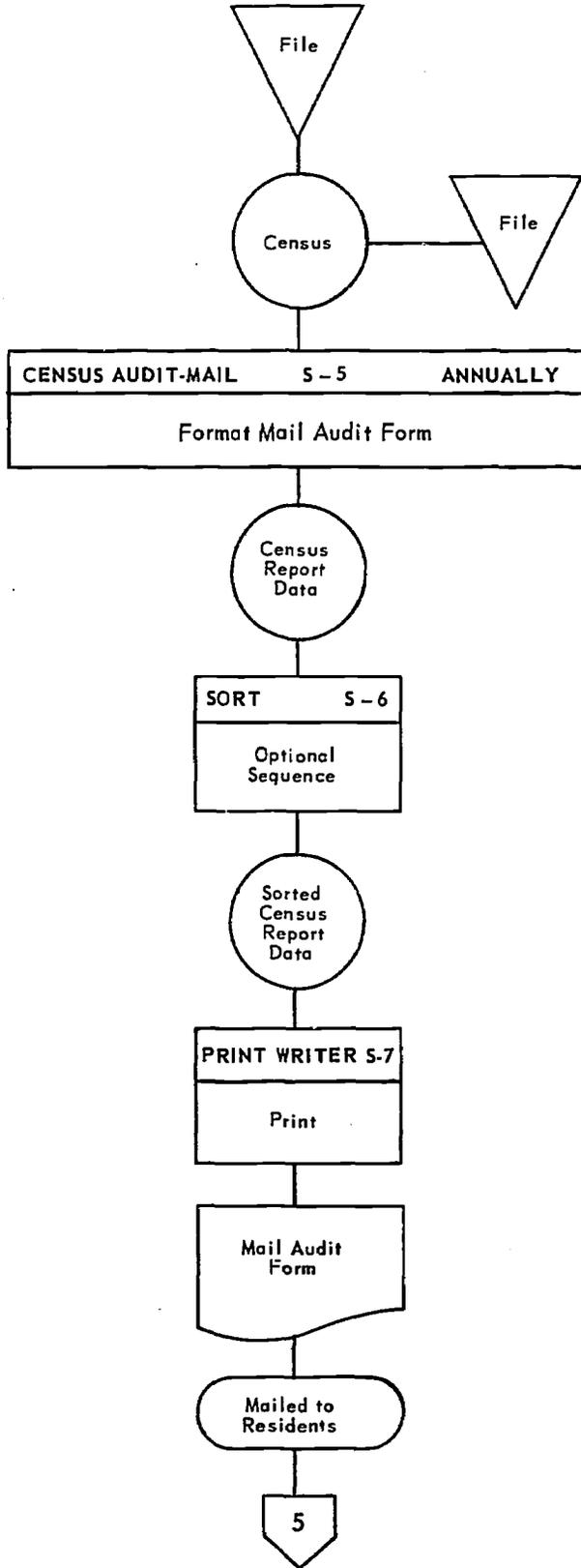


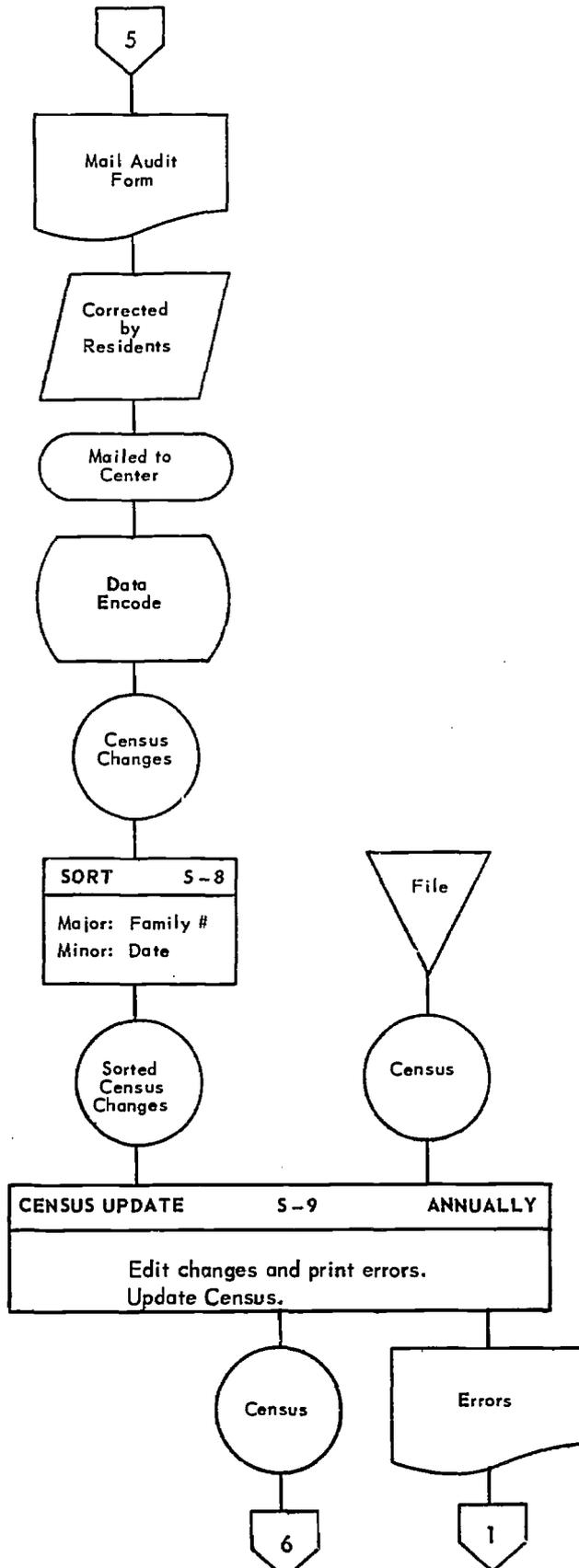


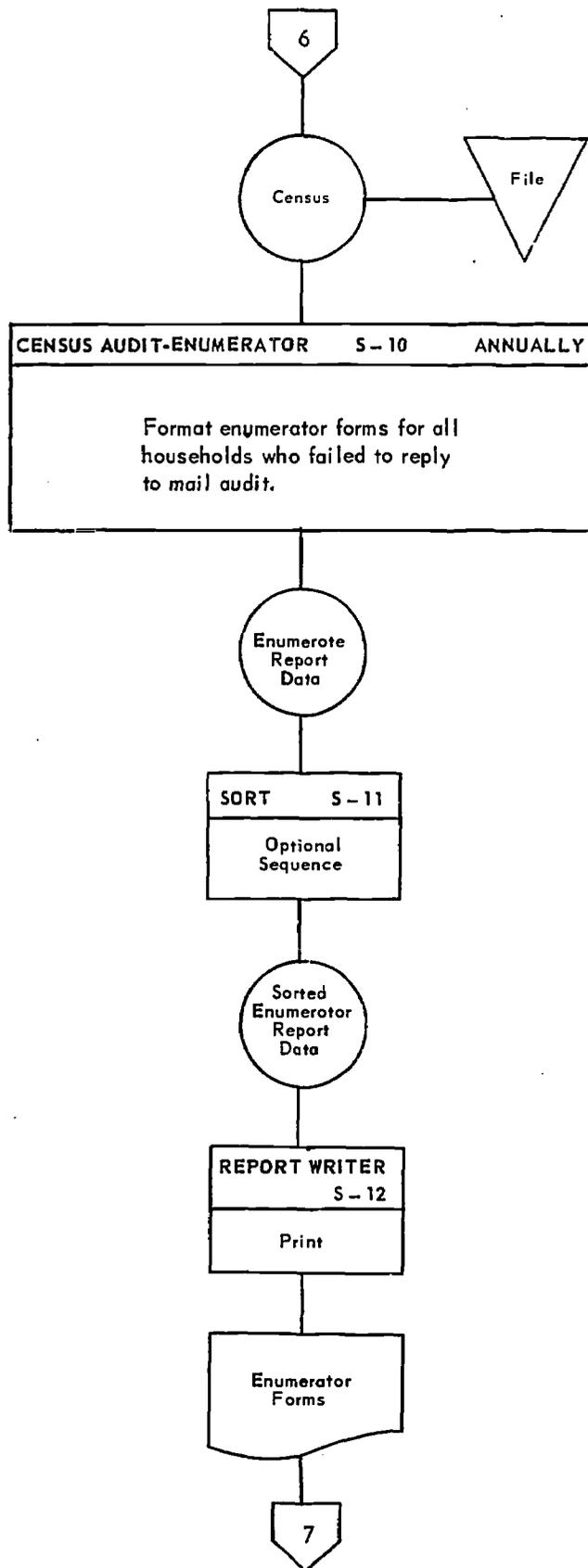
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CENSUS / ENROLLMENT



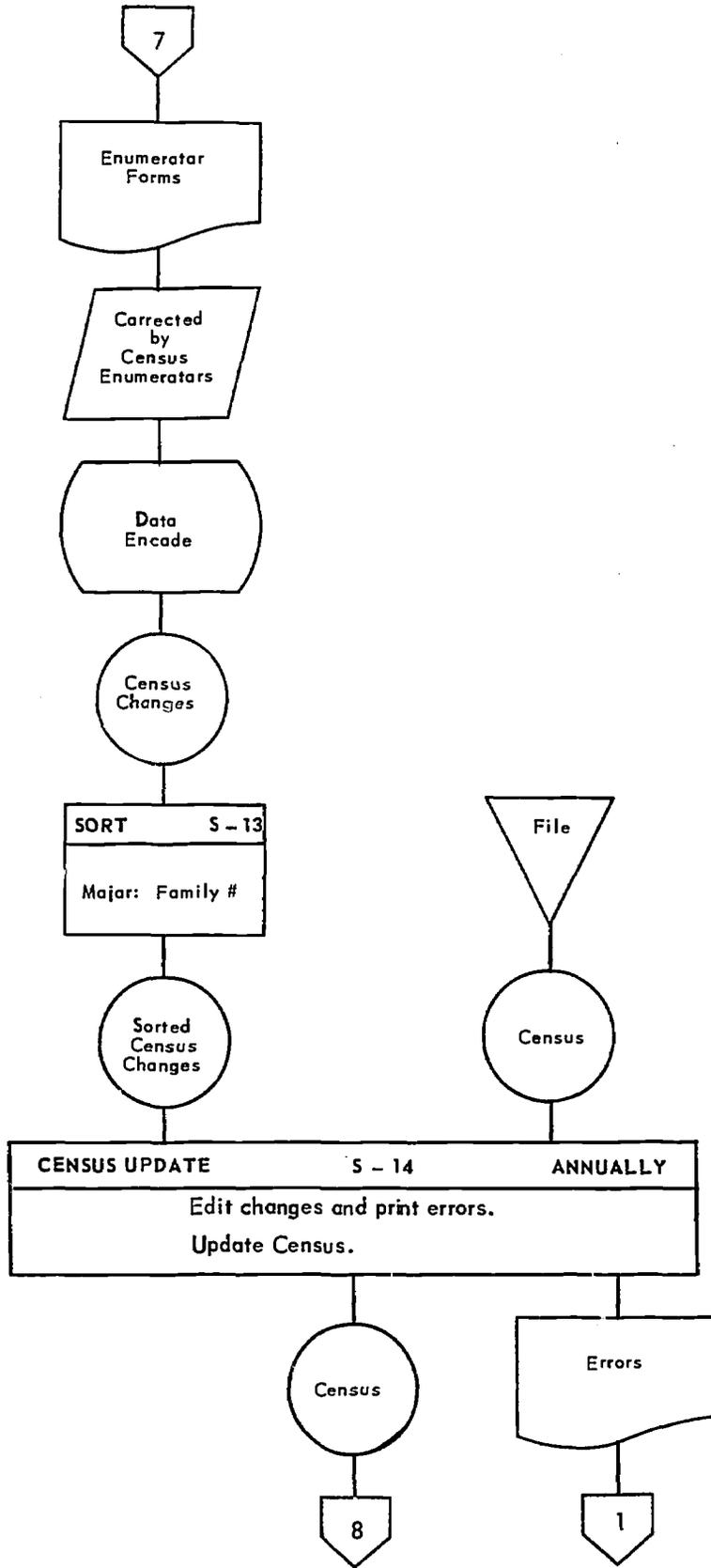
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CENSUS / ENROLLMENT

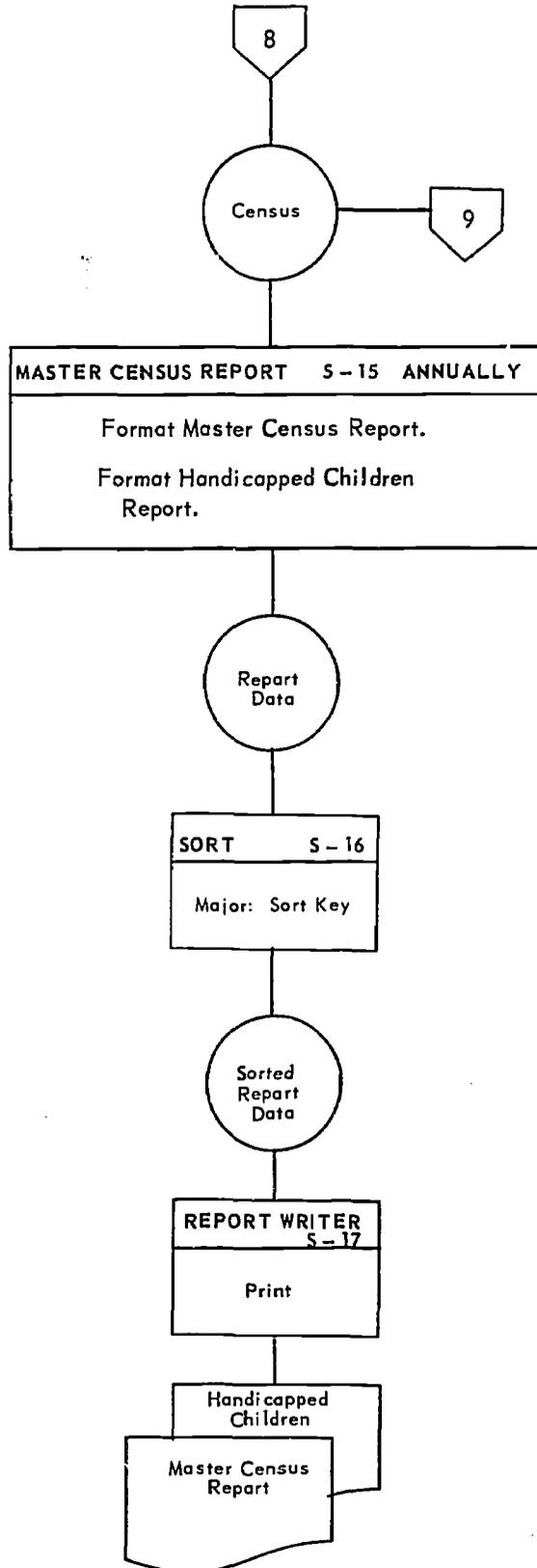


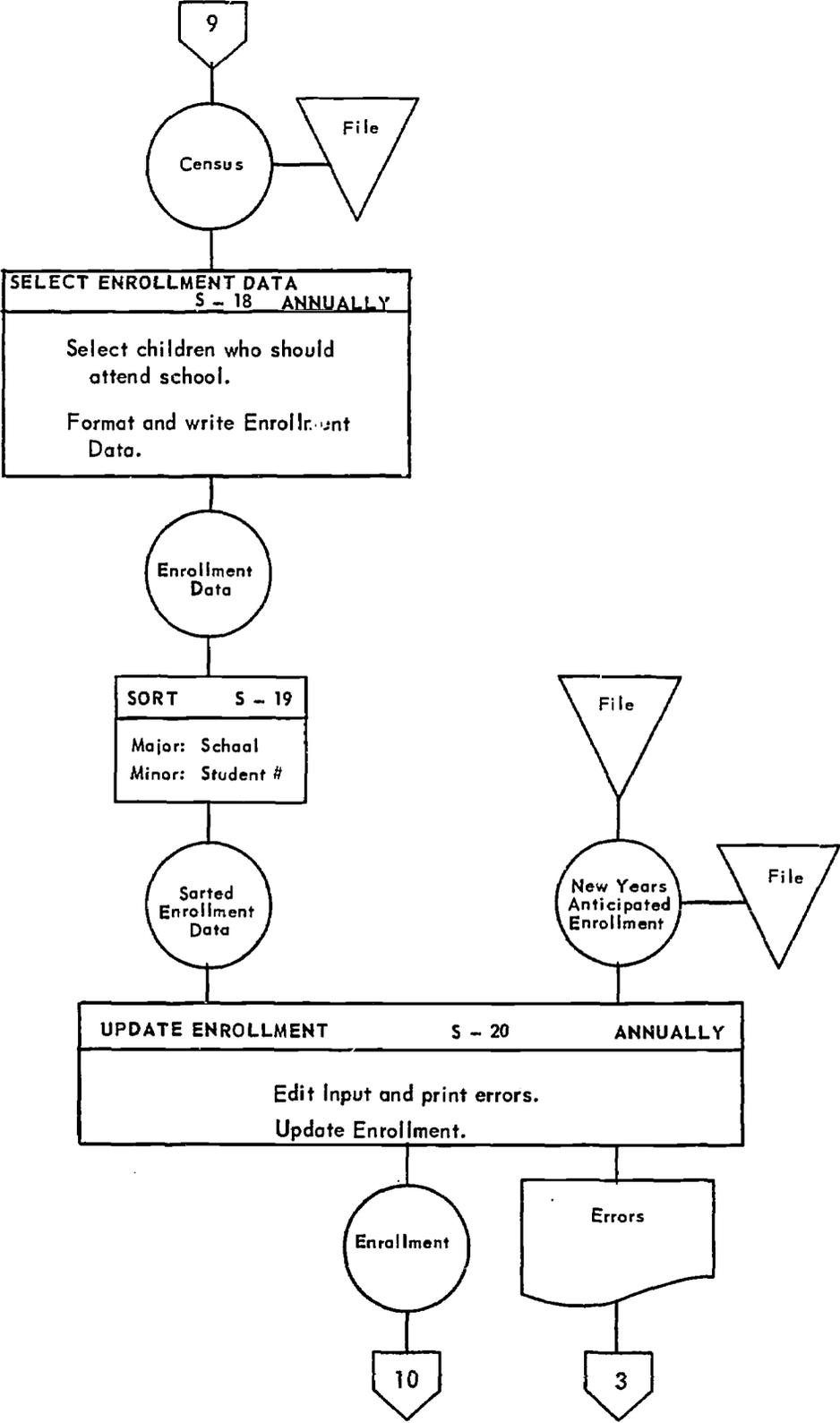


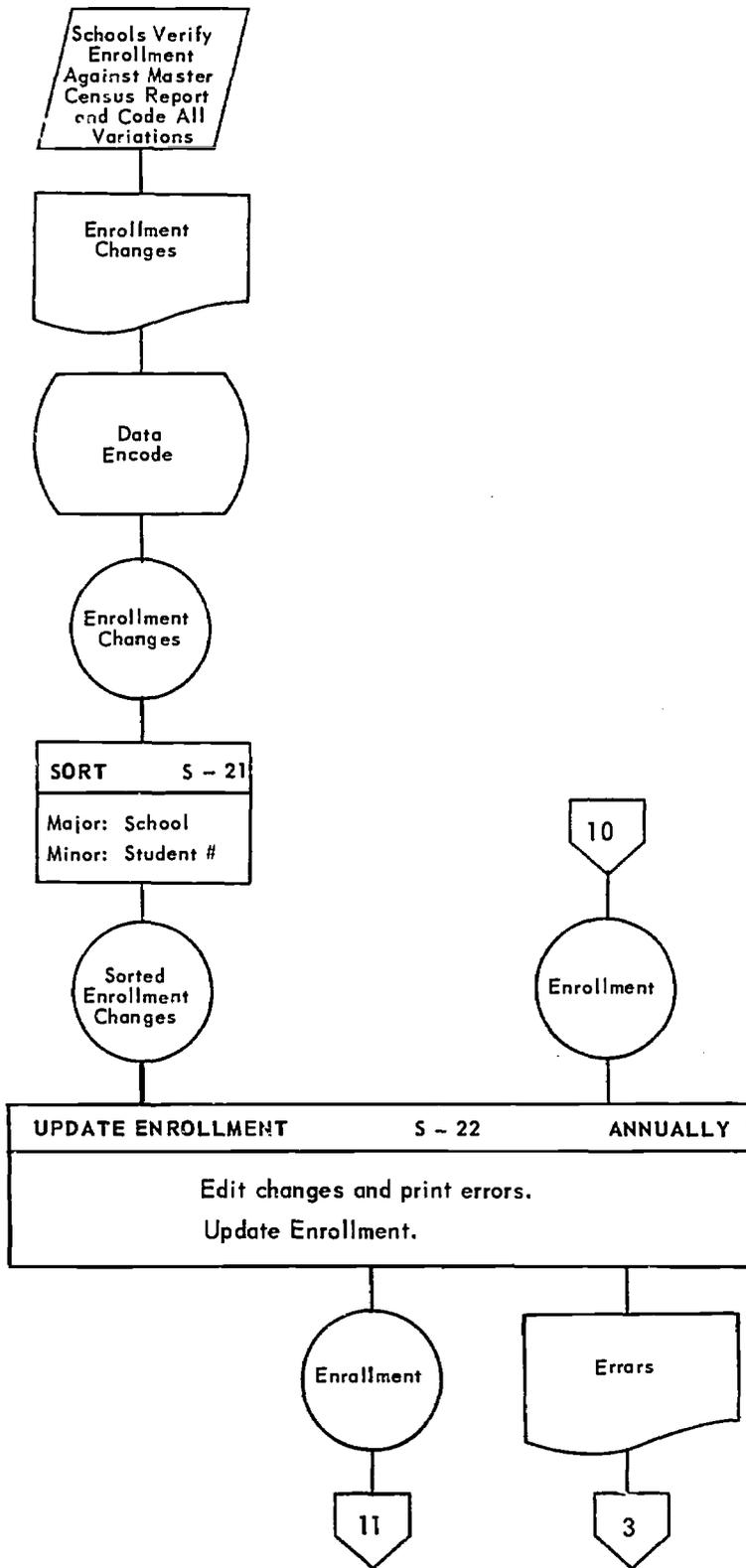


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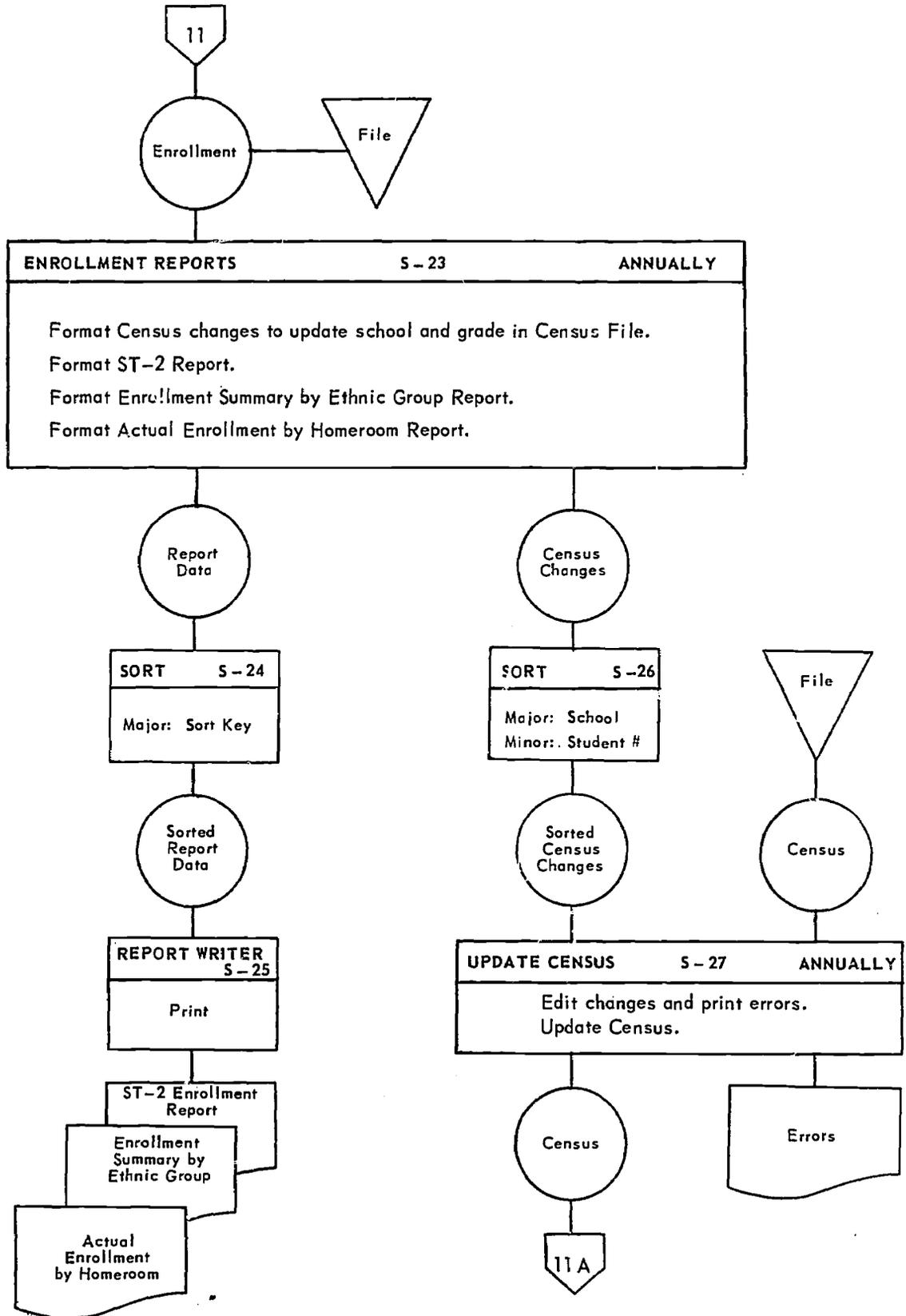


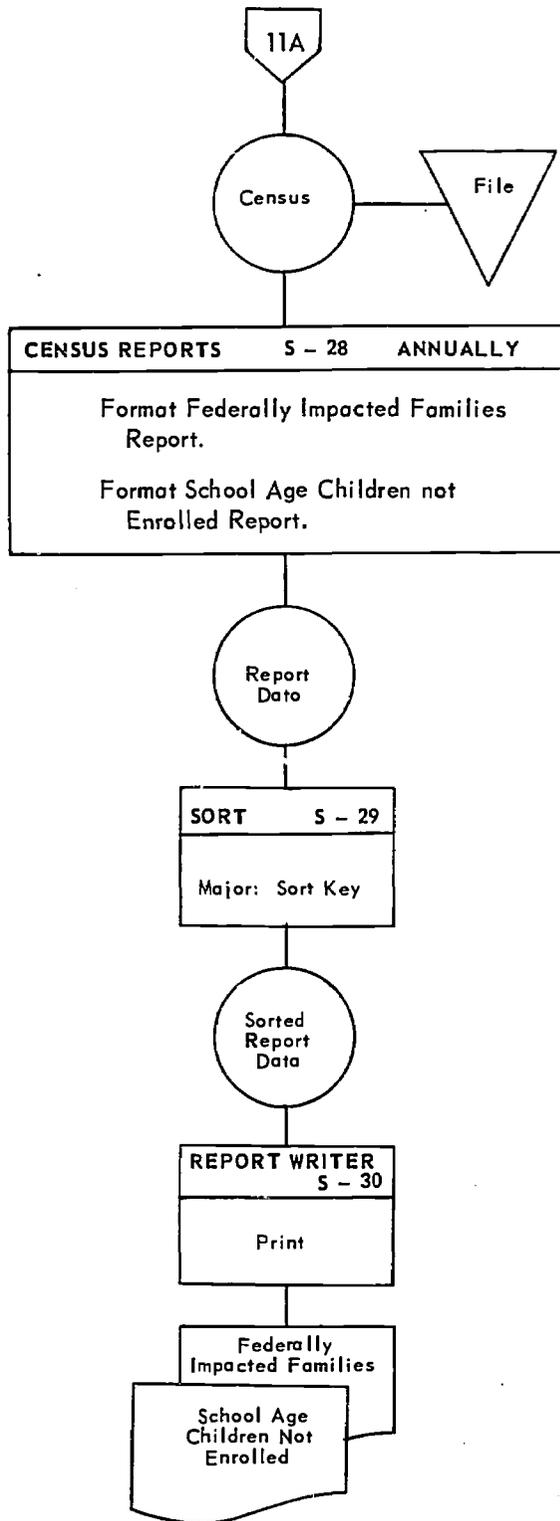


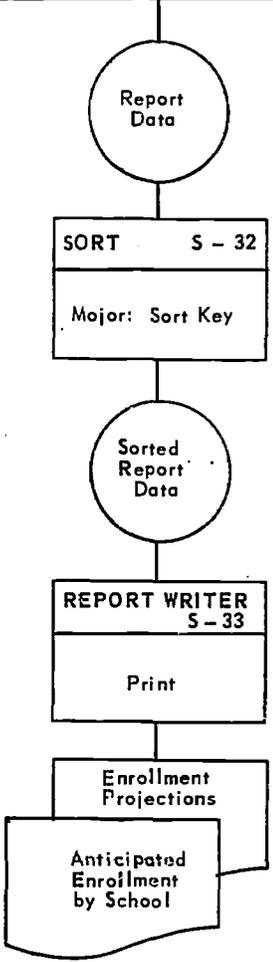
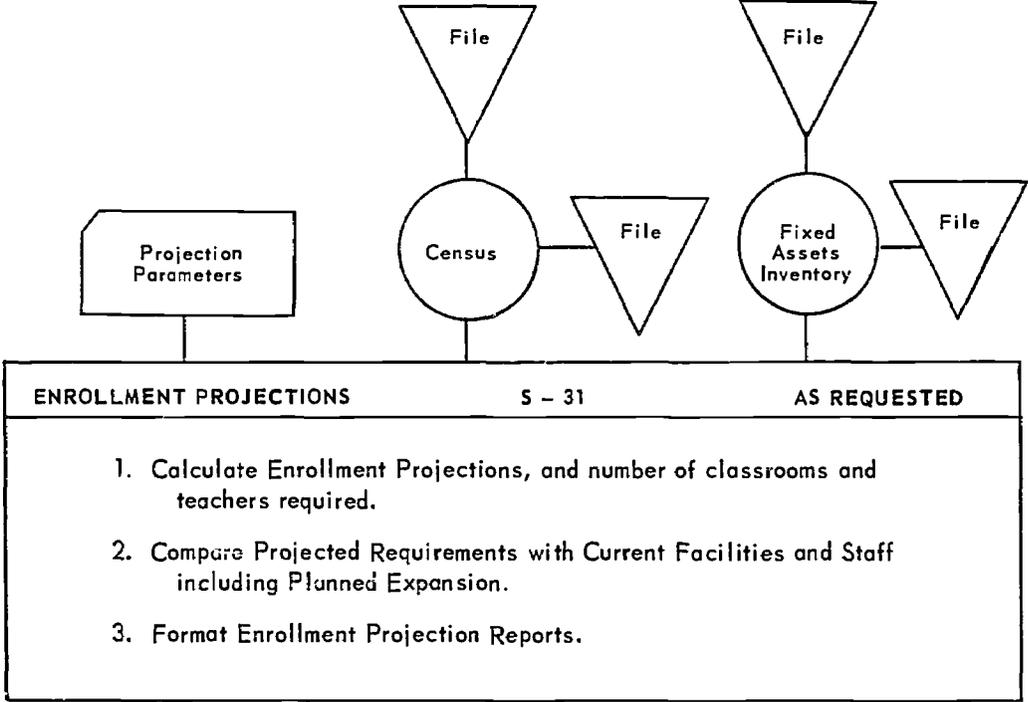




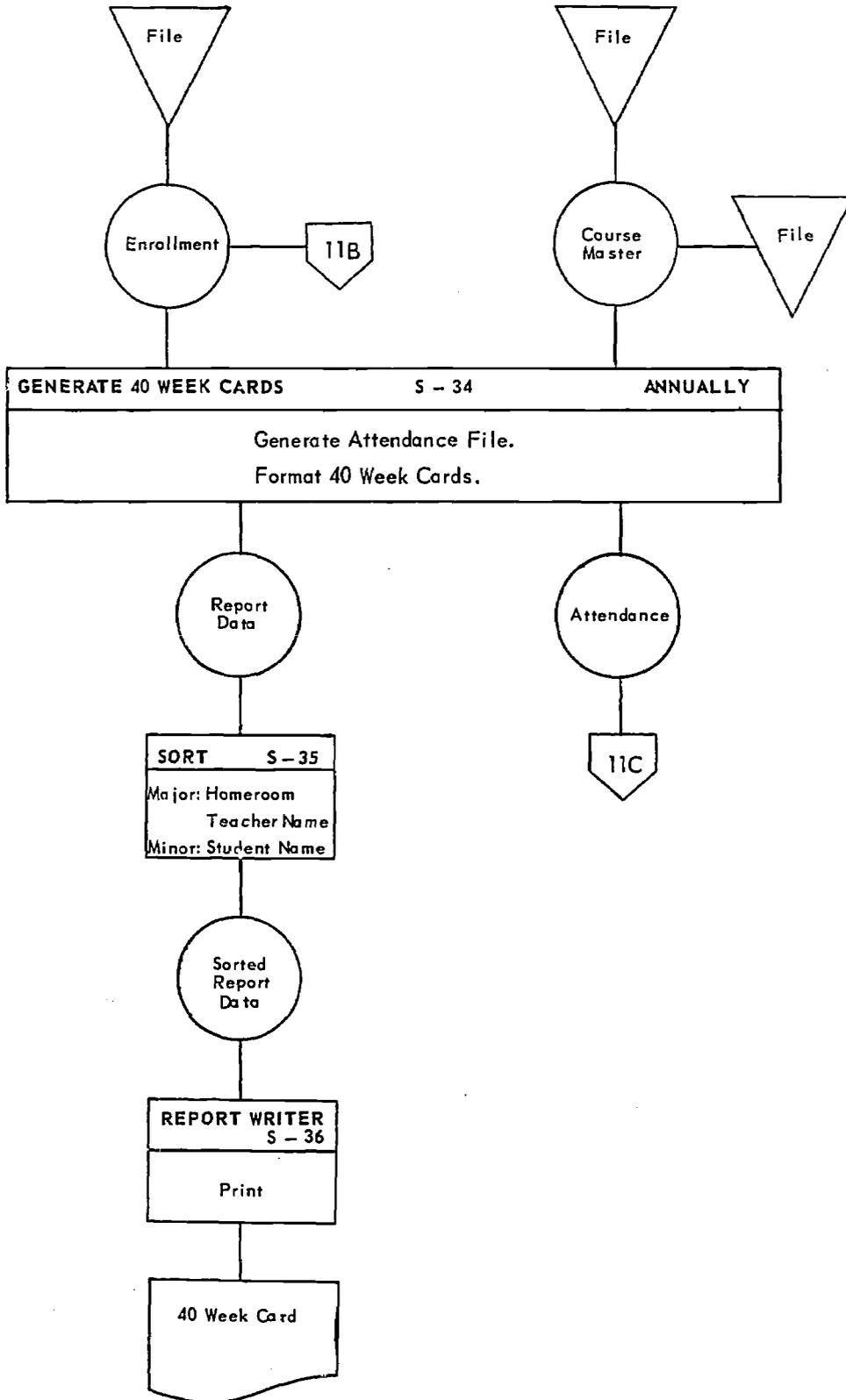
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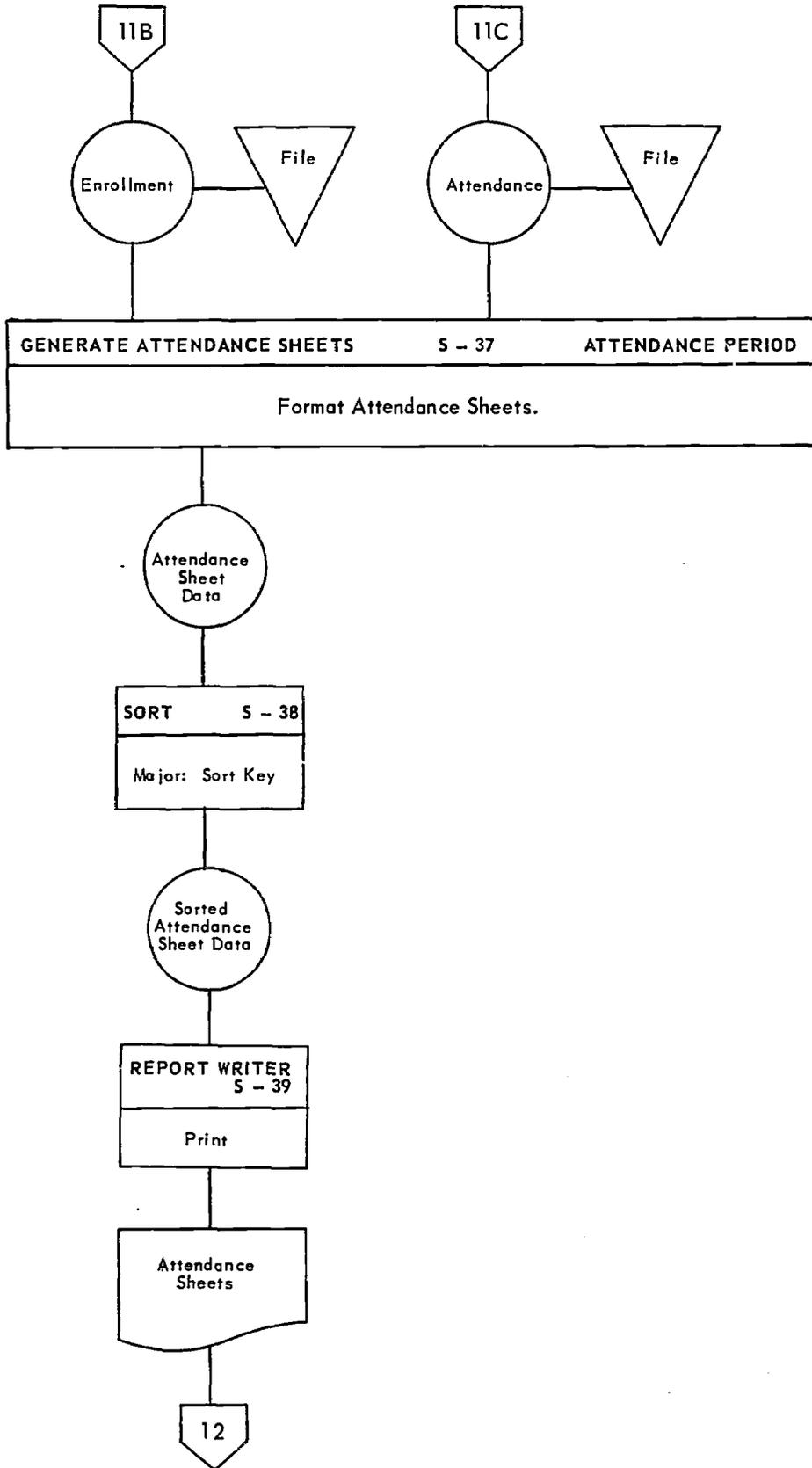




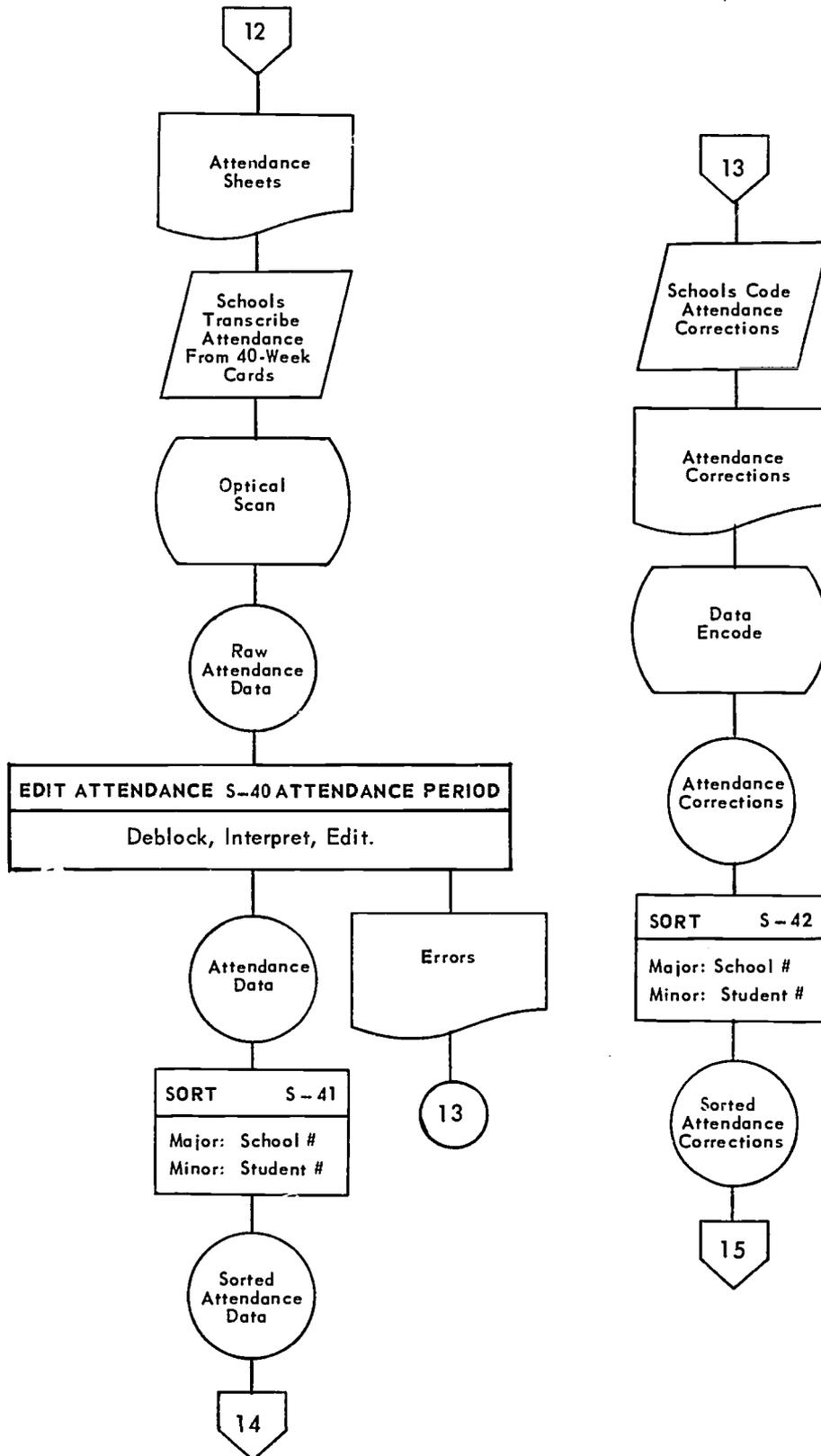


NYSEIS
ATTENDANCE

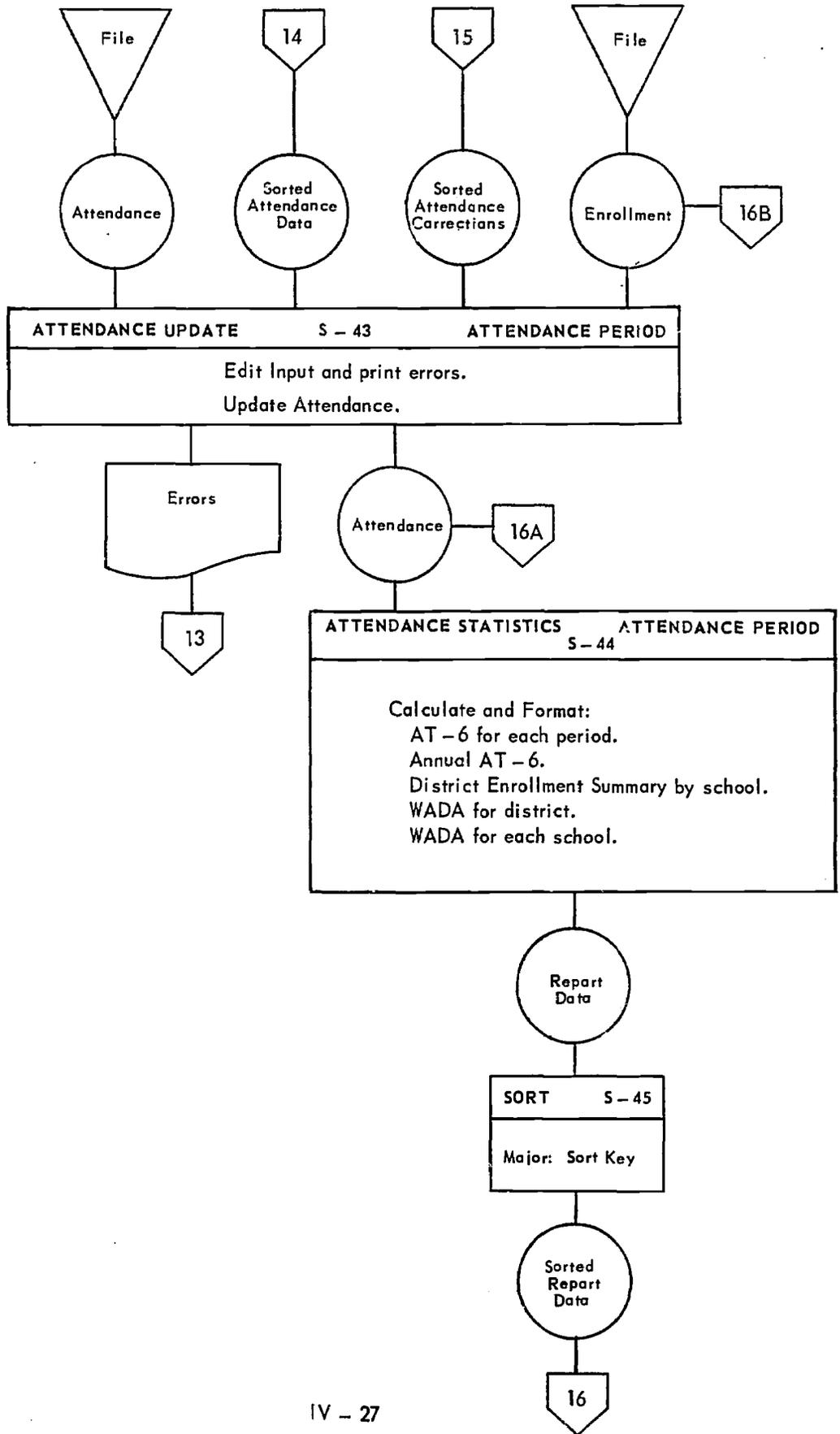


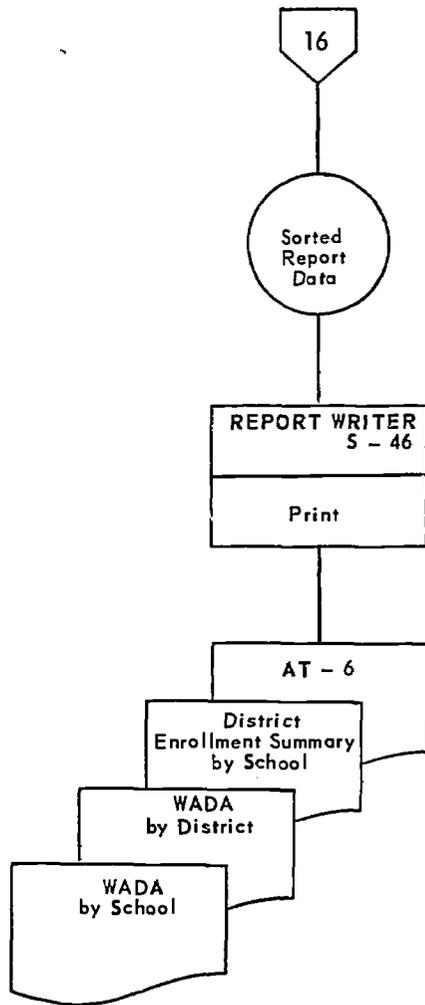


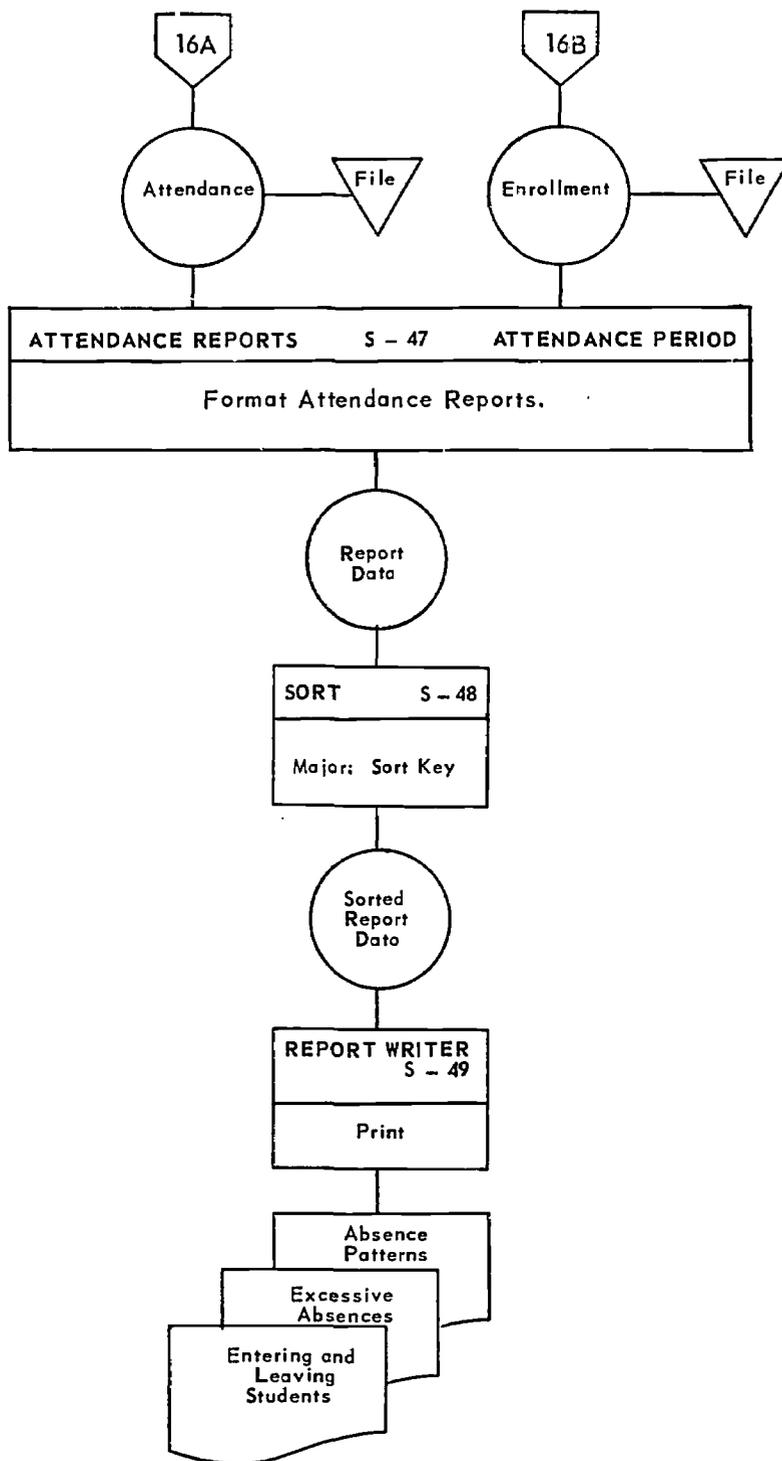
**NYSEIS
ATTENDANCE**



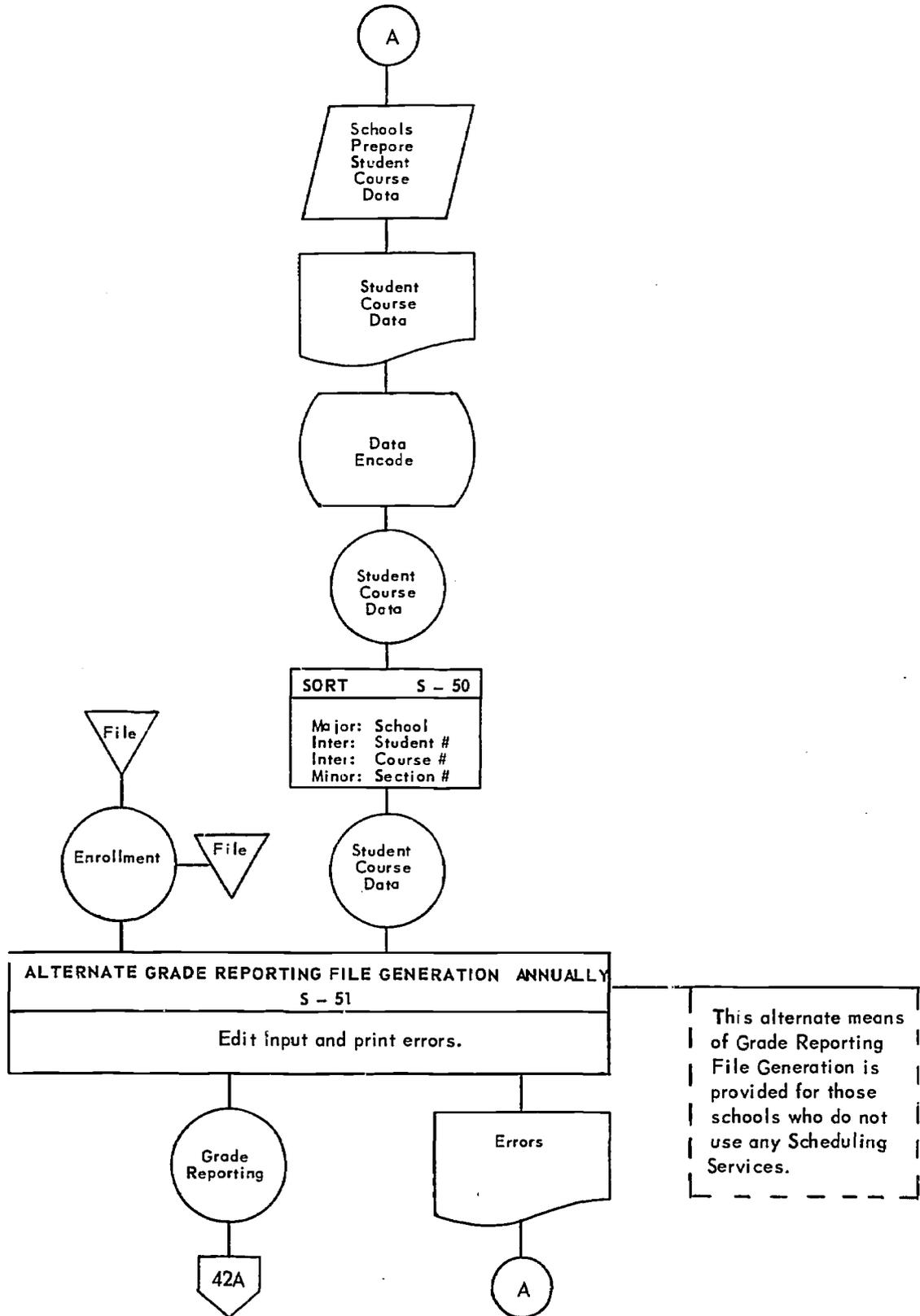
NYSEIS
ATTENDANCE





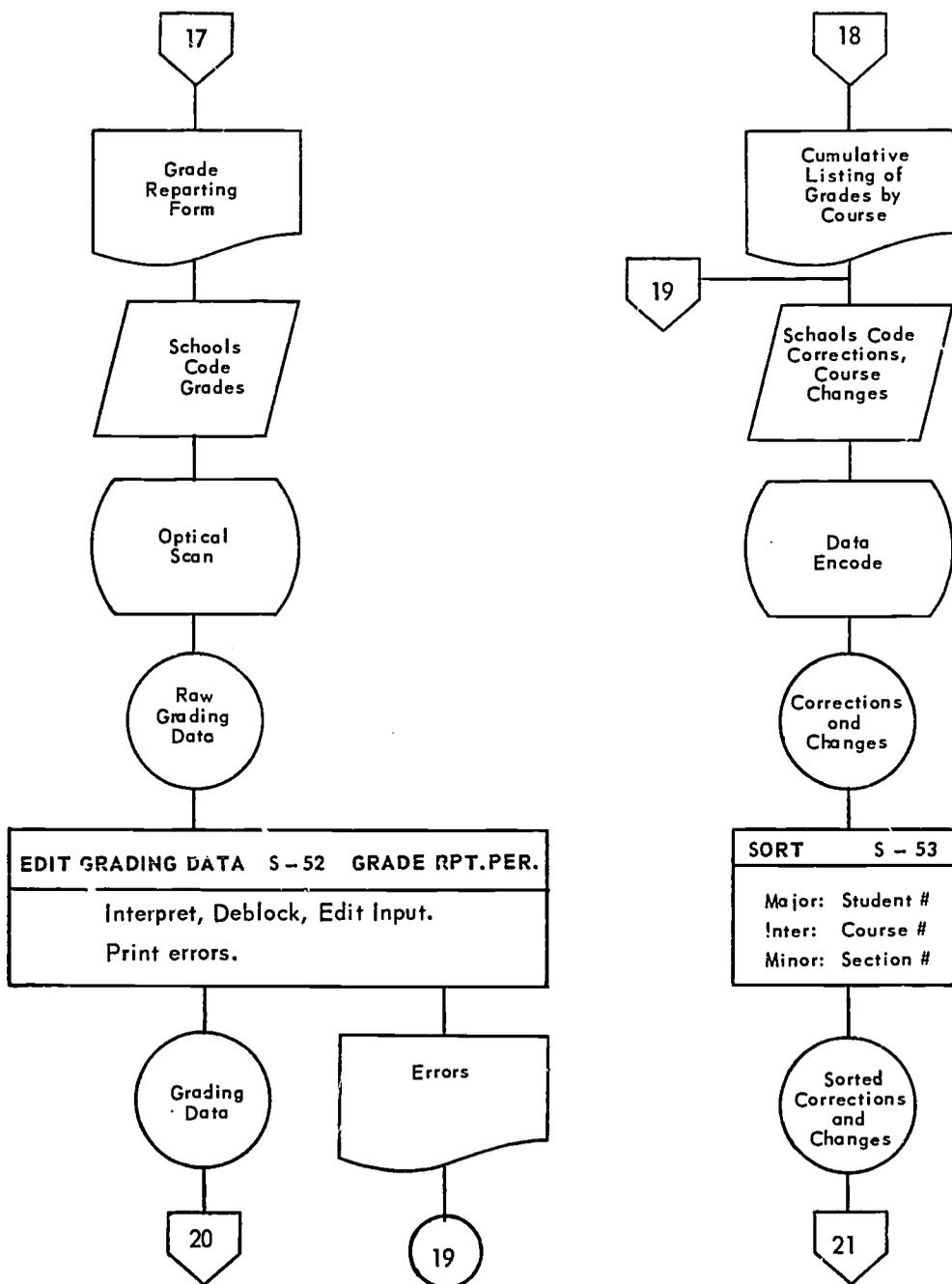


NYSEIS
GRADE REPORTING

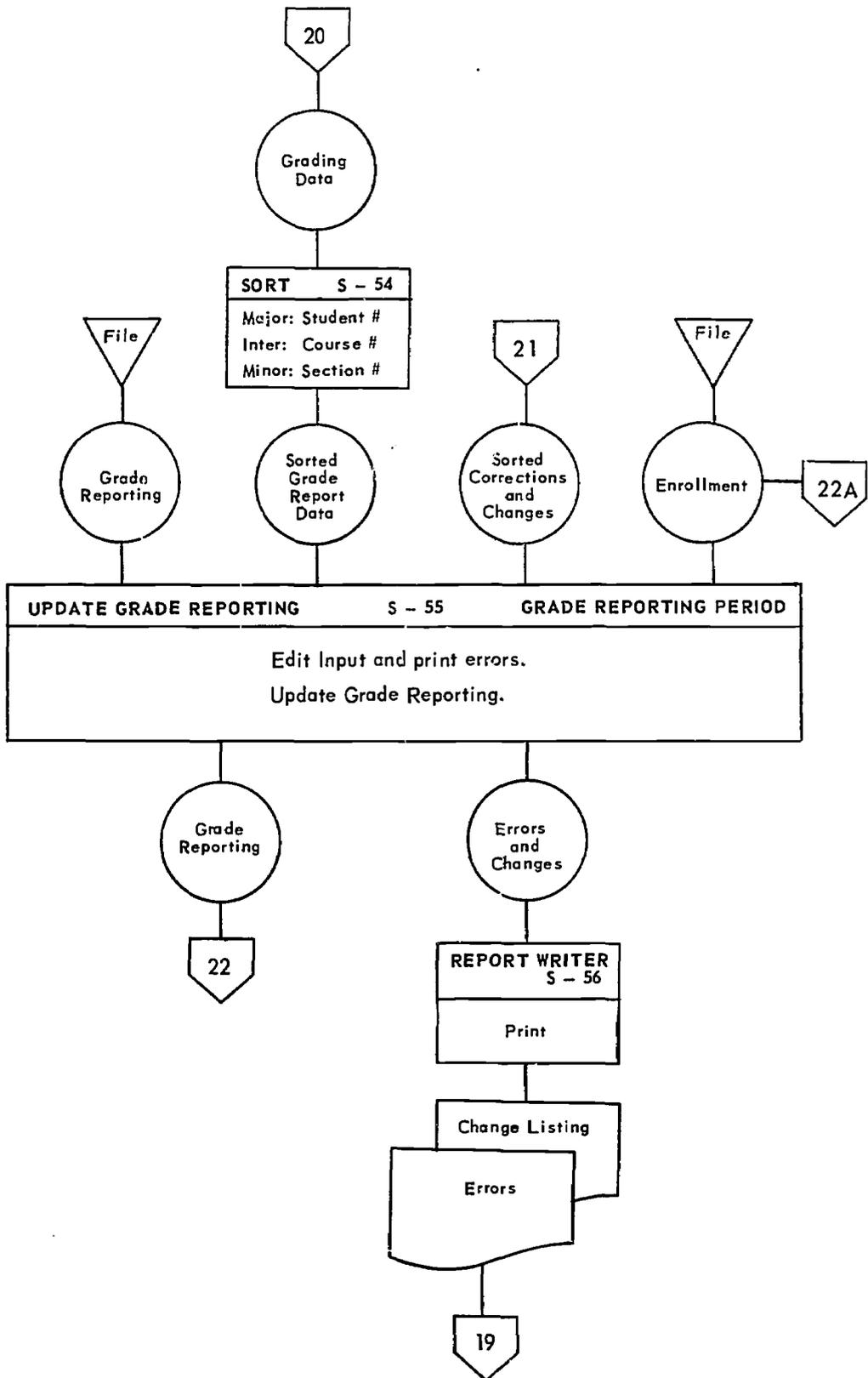


This alternate means of Grade Reporting File Generation is provided for those schools who do not use any Scheduling Services.

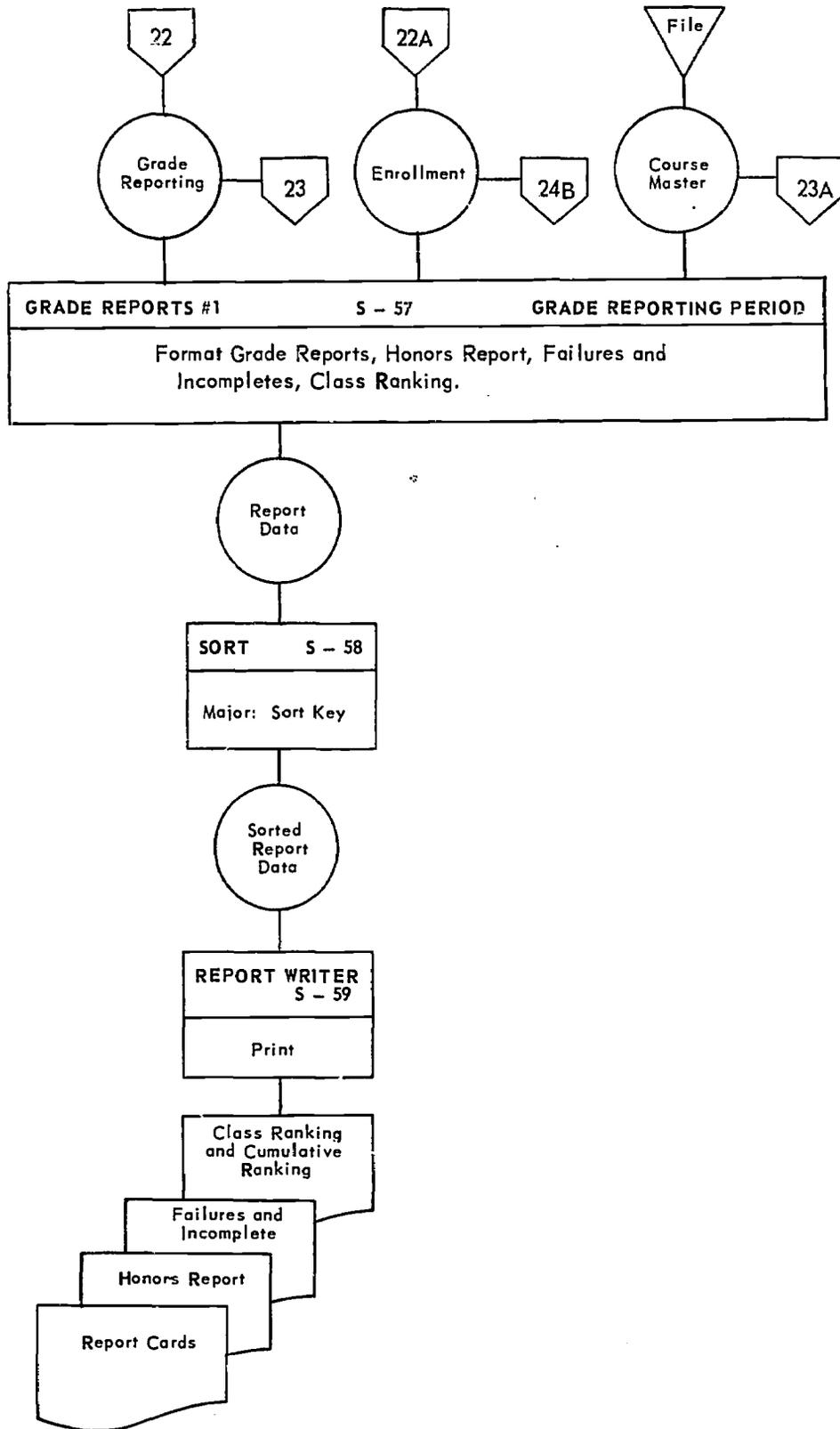
**NYSEIS
GRADE REPORTING**



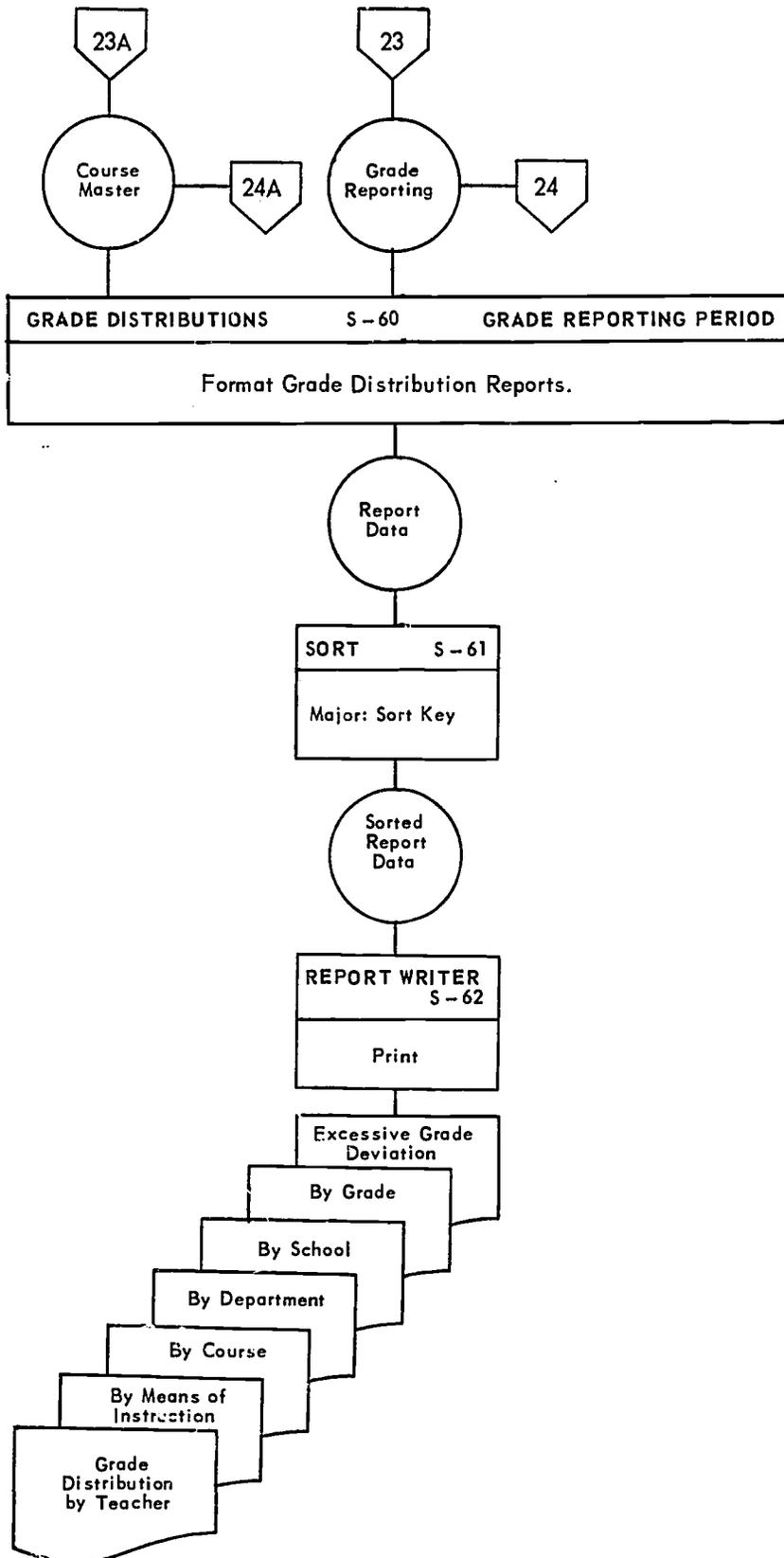
NYSEIS
GRADE REPORTING



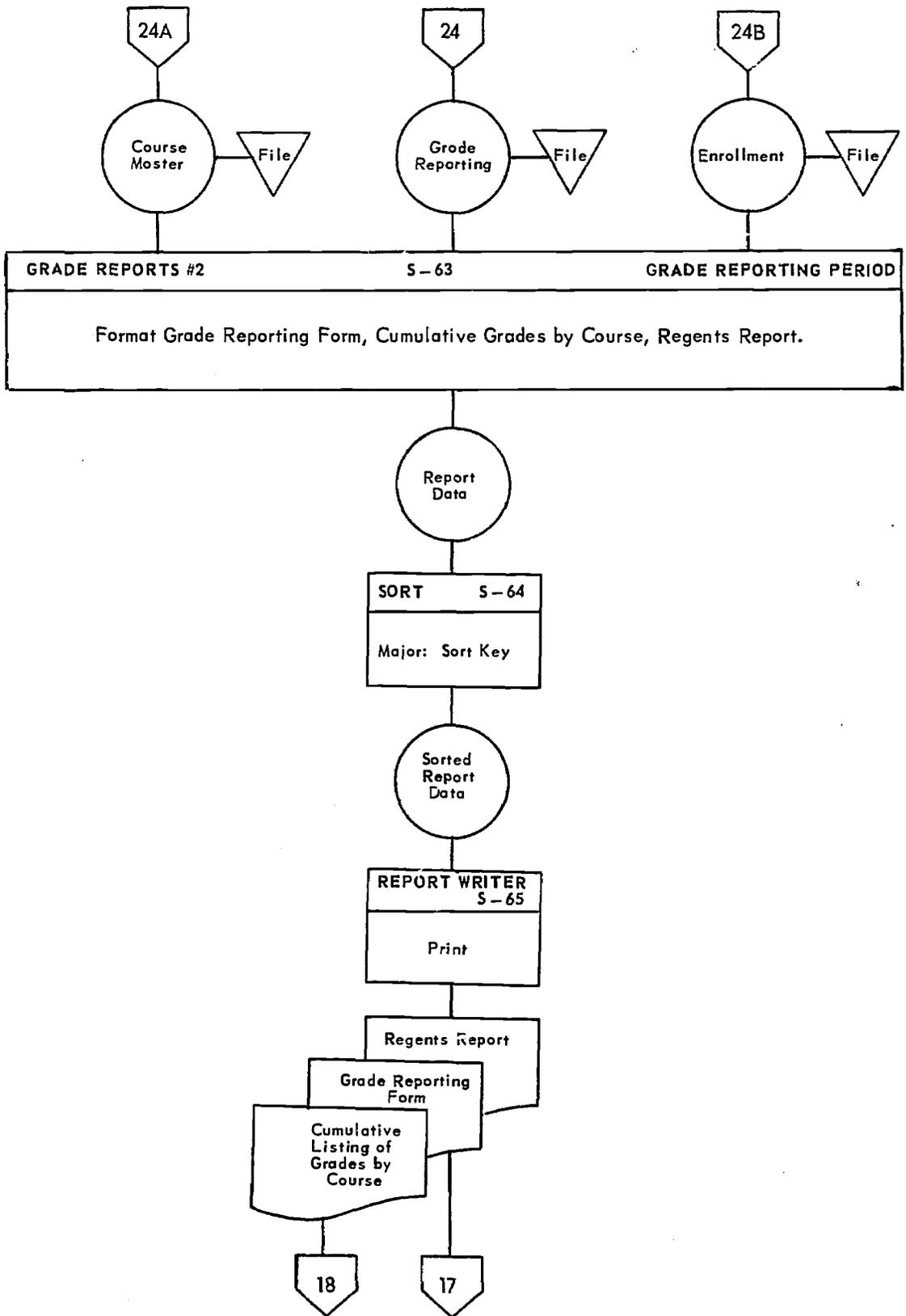
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GRADE REPORTING**



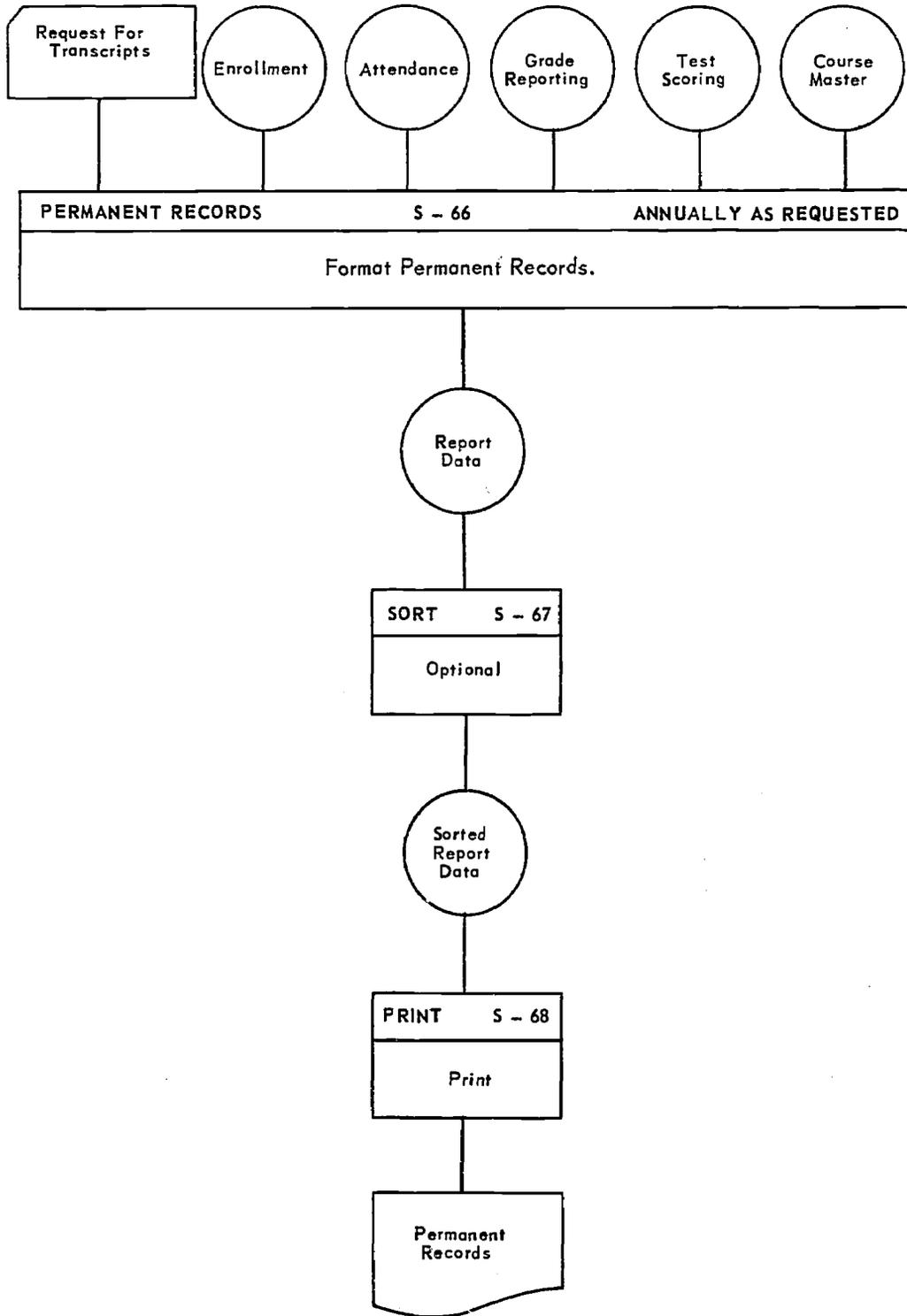
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GRADE REPORTING**



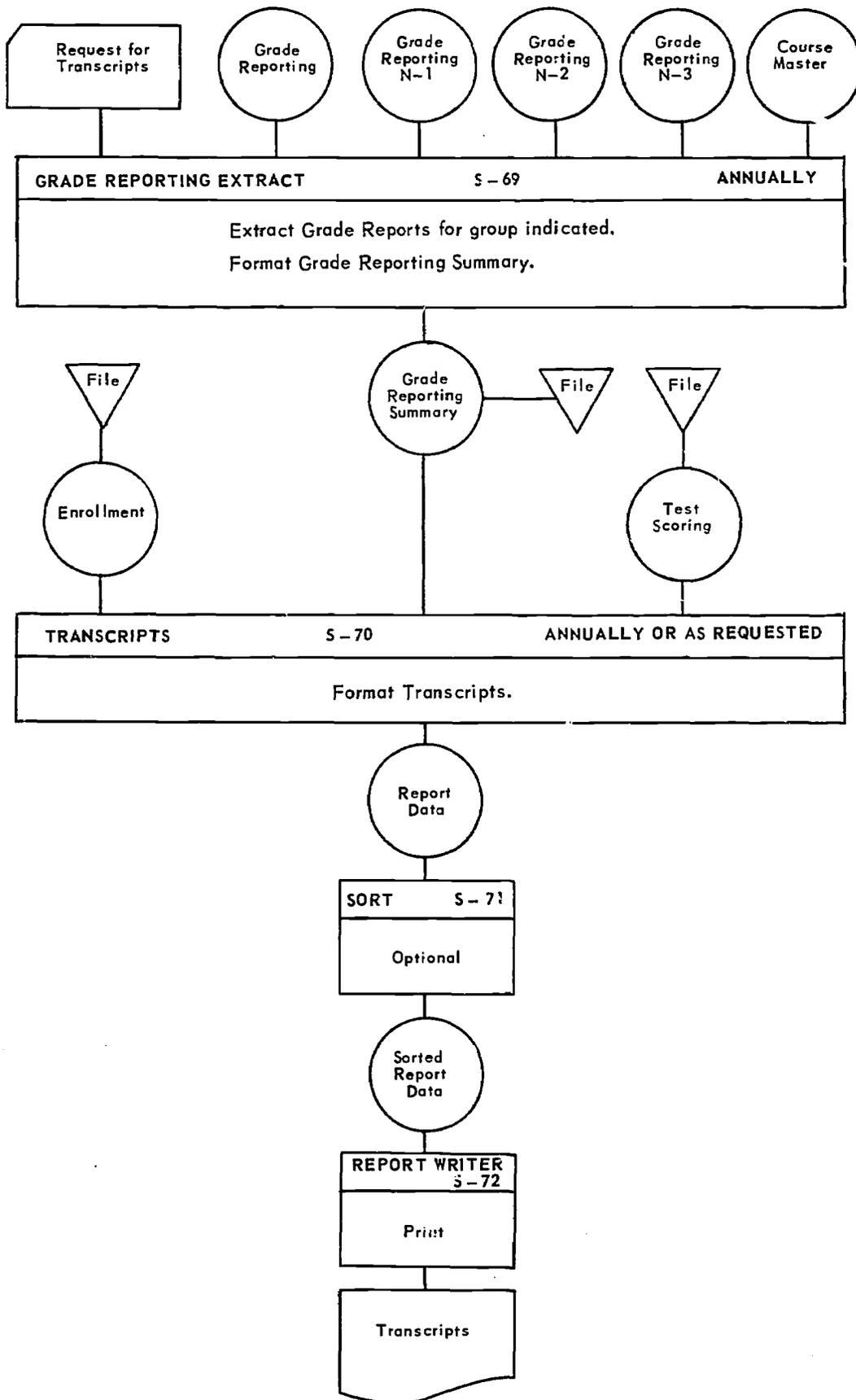
NYSEIS
GRADE REPORTING



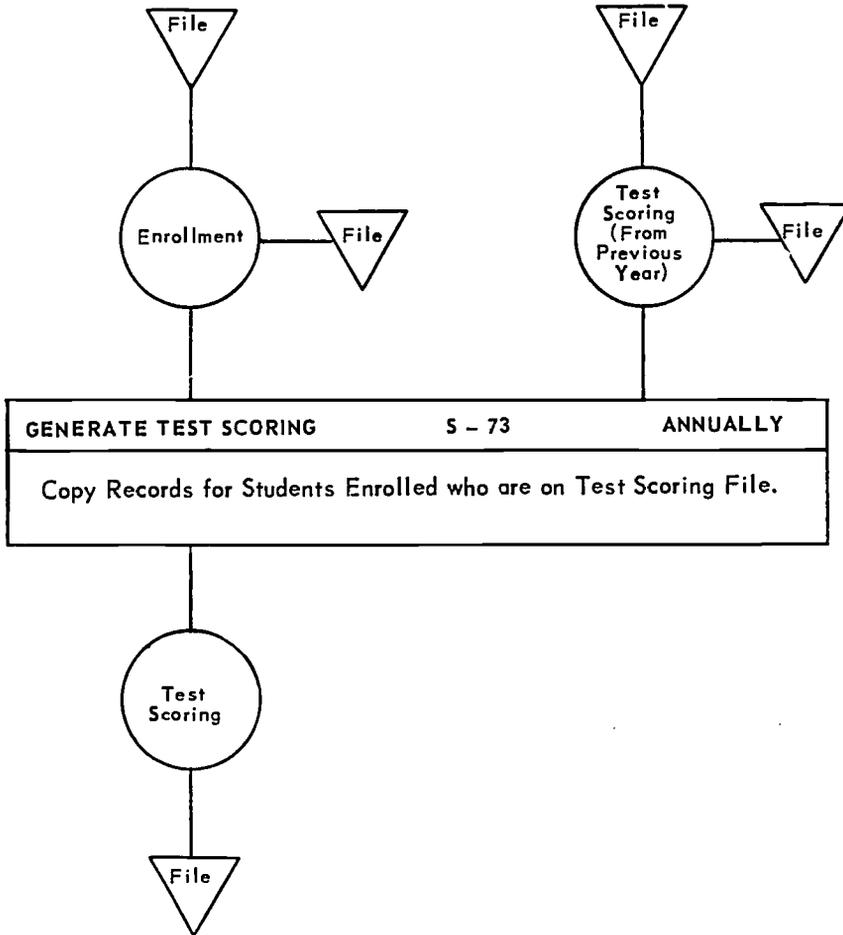
NYSEIS
PERMANENT RECORDS



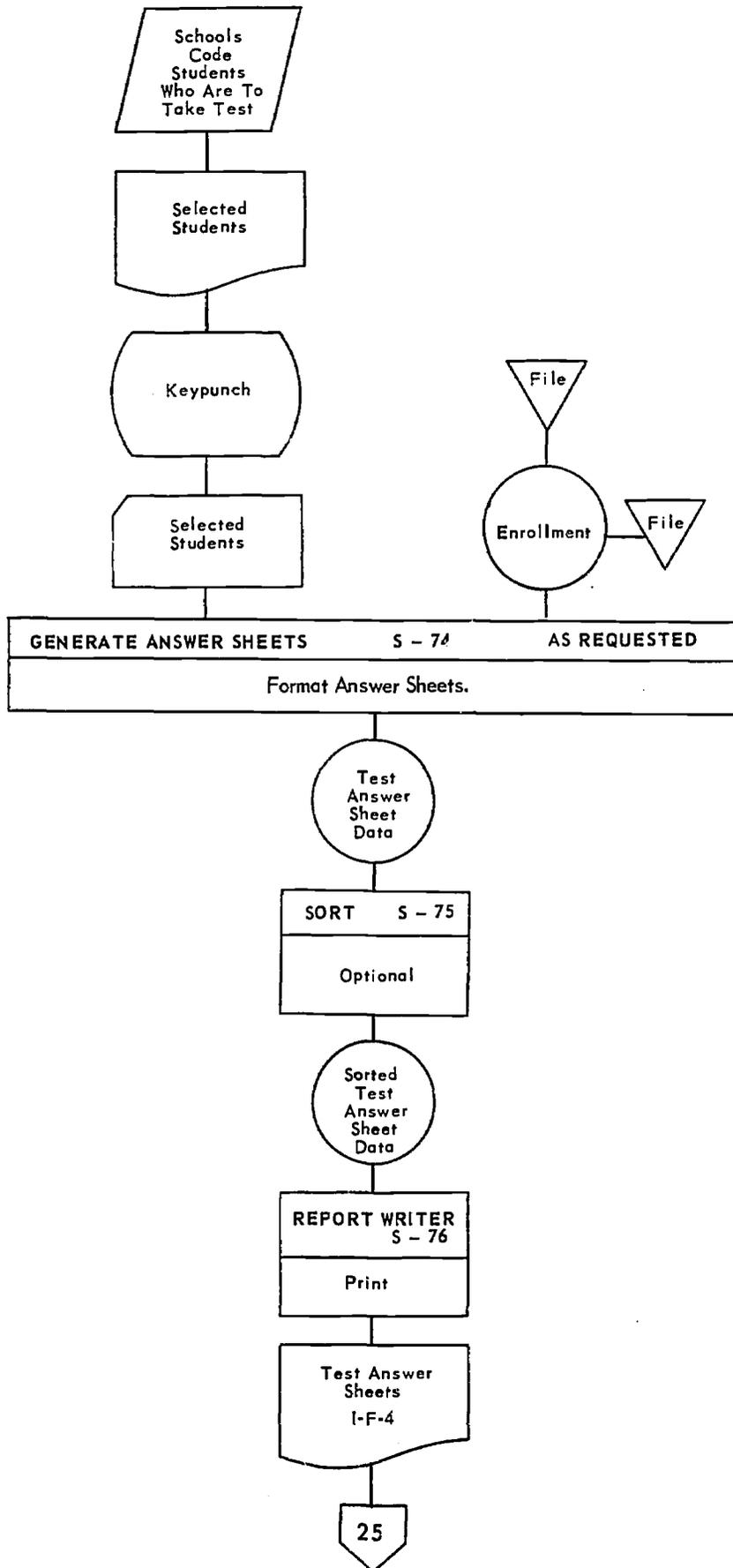
NYSEIS
PERMANENT RECORDS

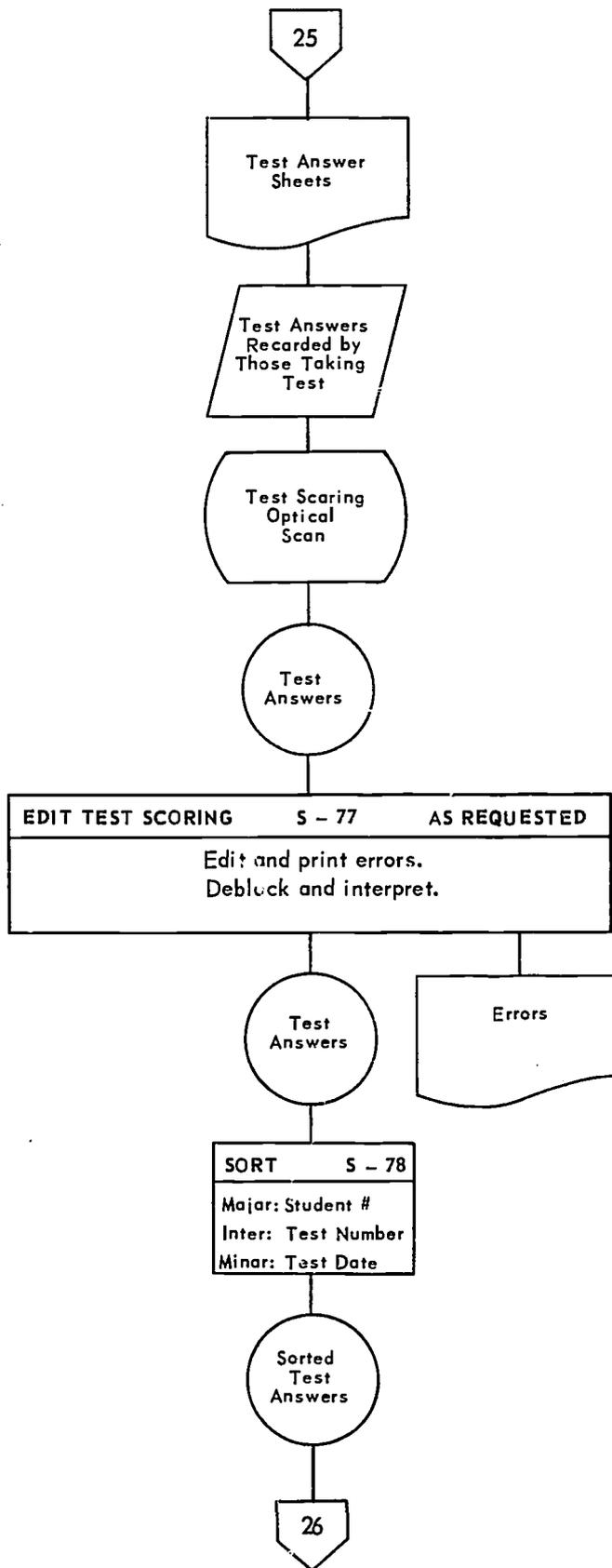


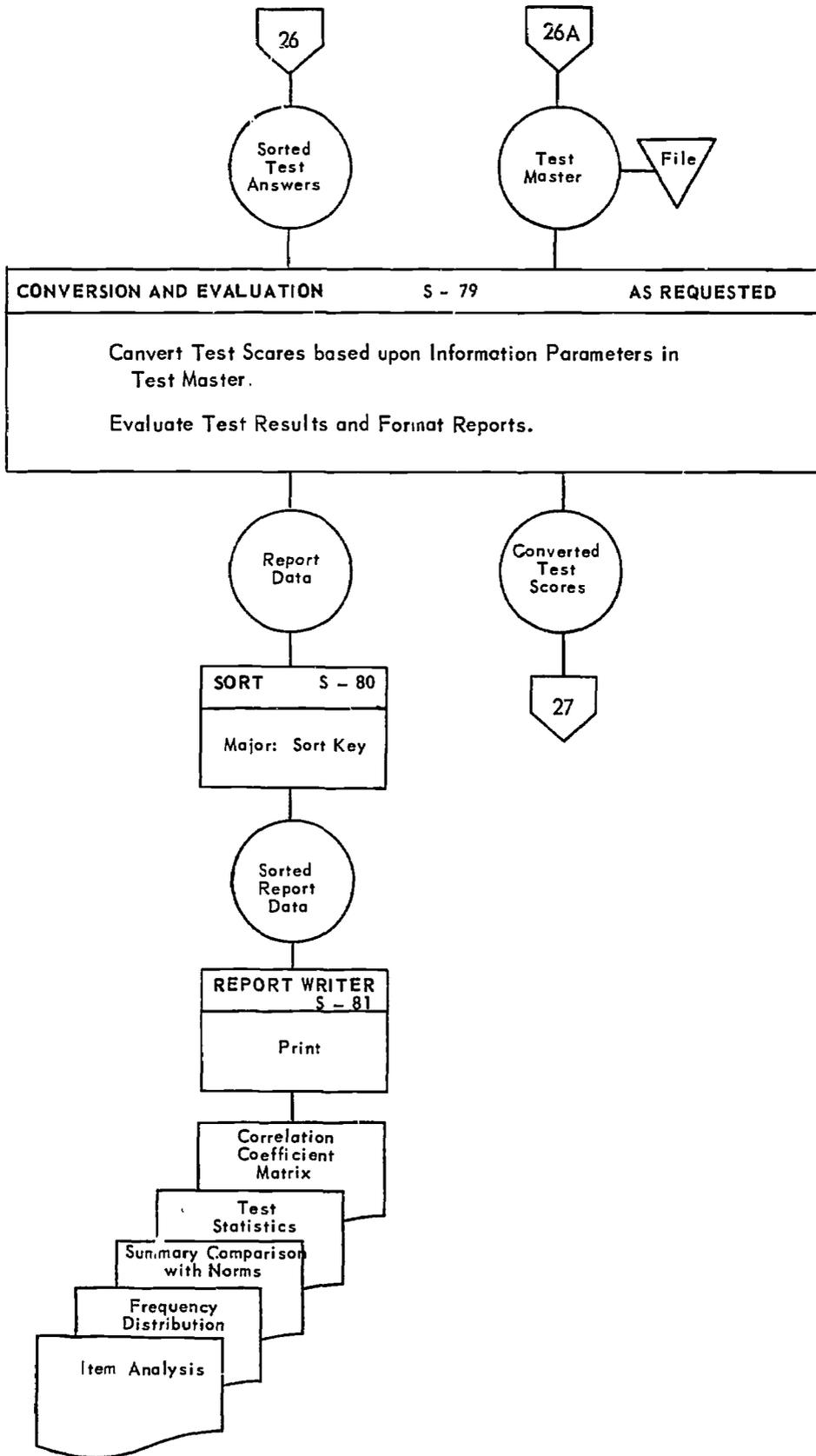
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TEST SCORING**



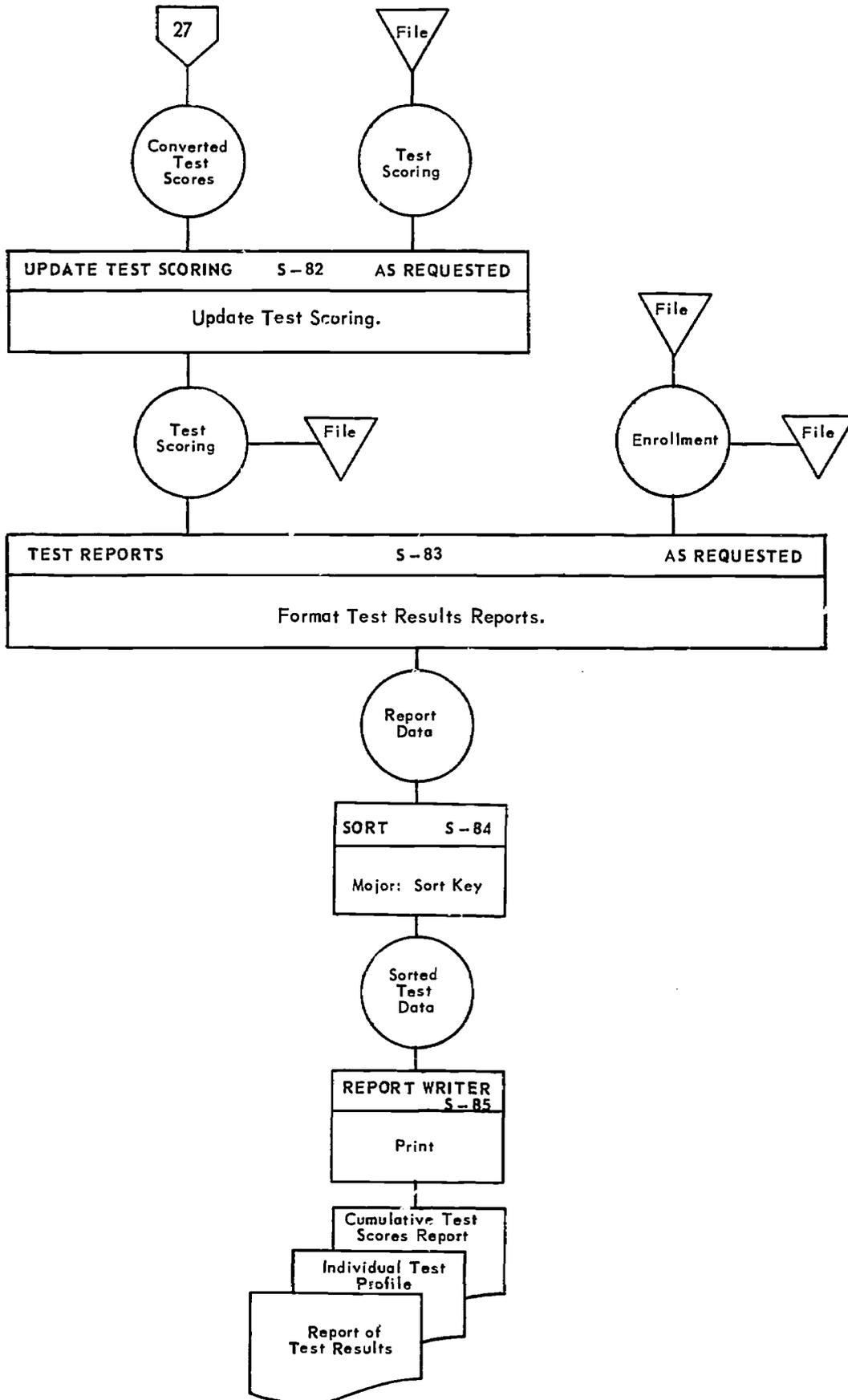
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TEST SCORING



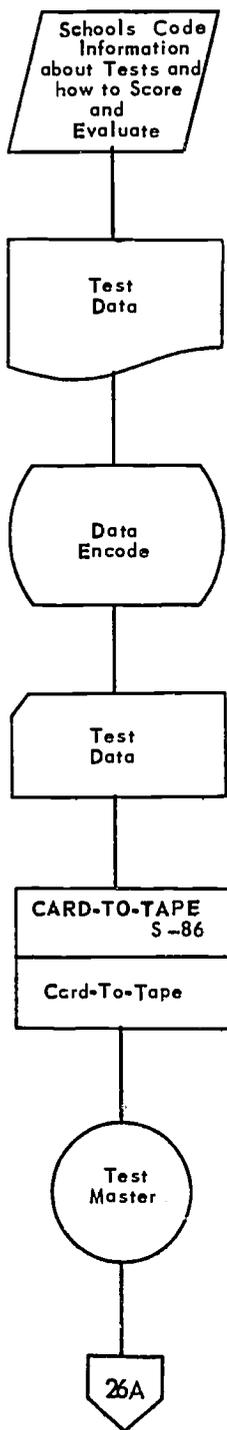




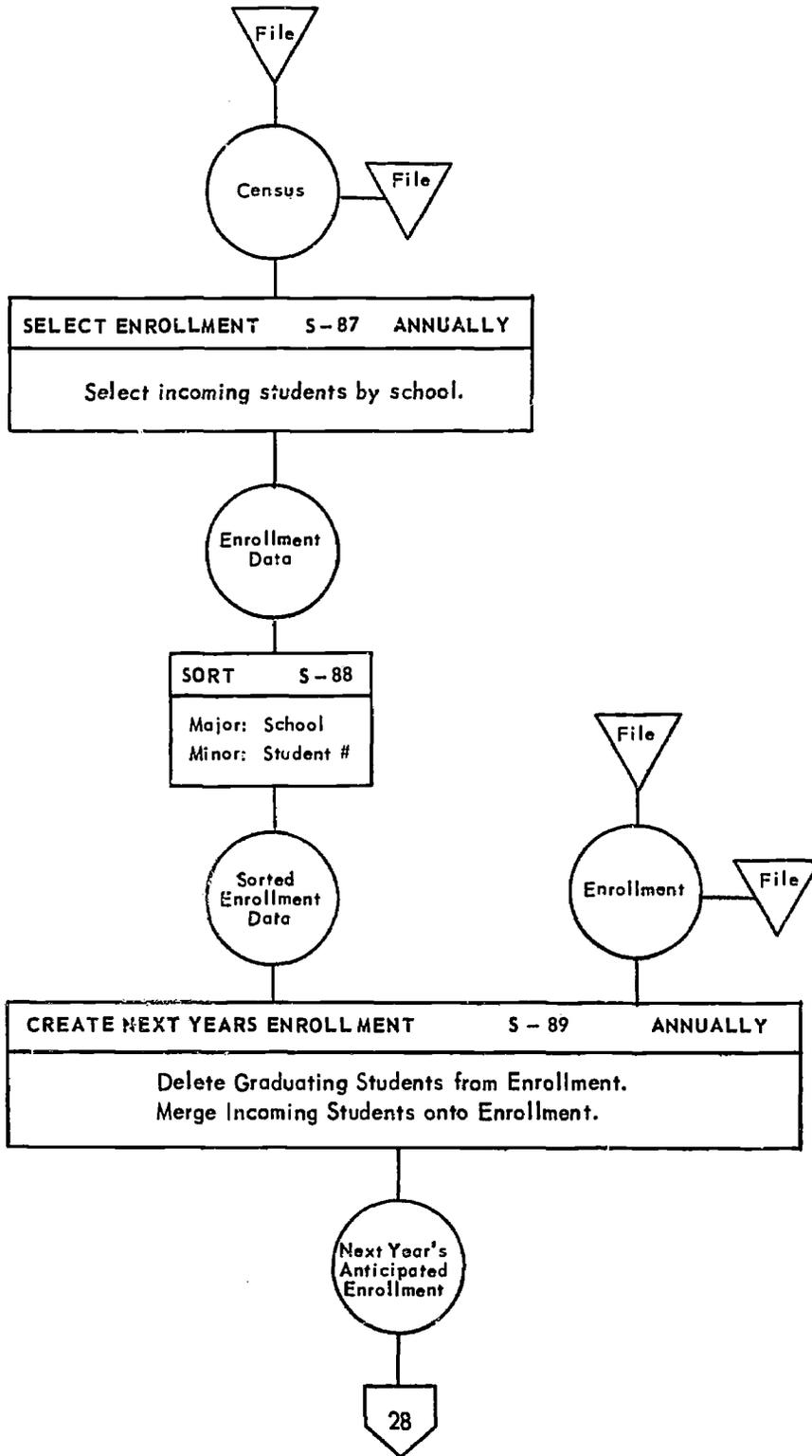
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TEST SCORING

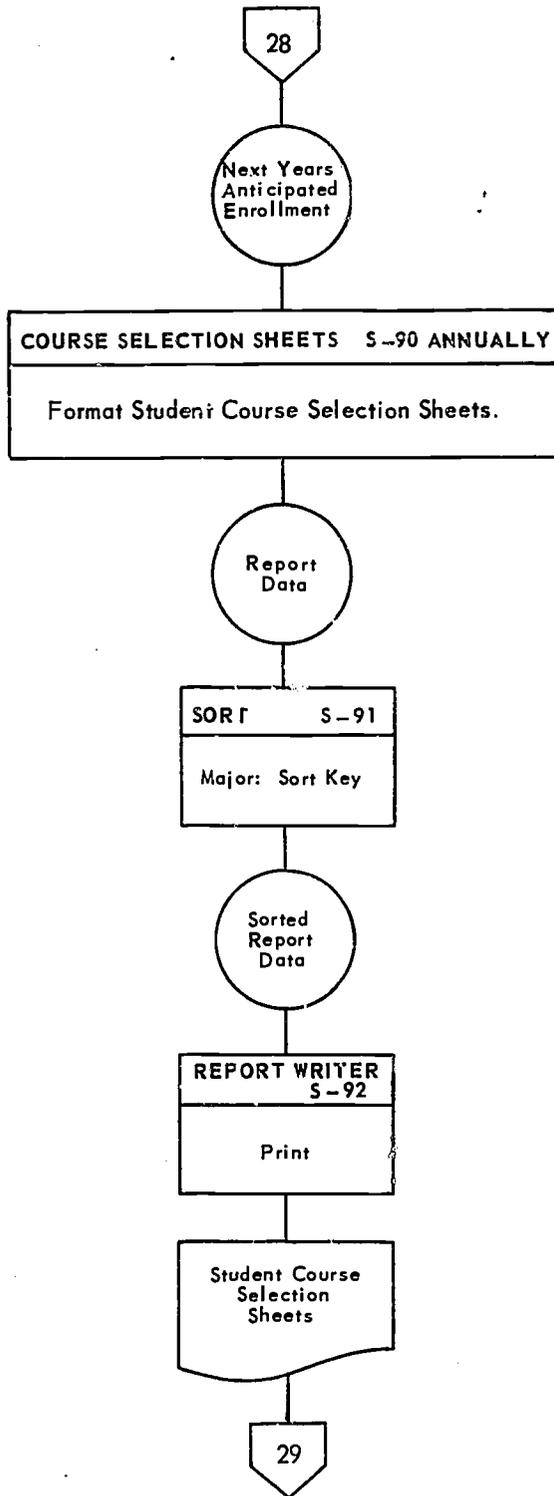


**NYSEIS
TEST SCORING**

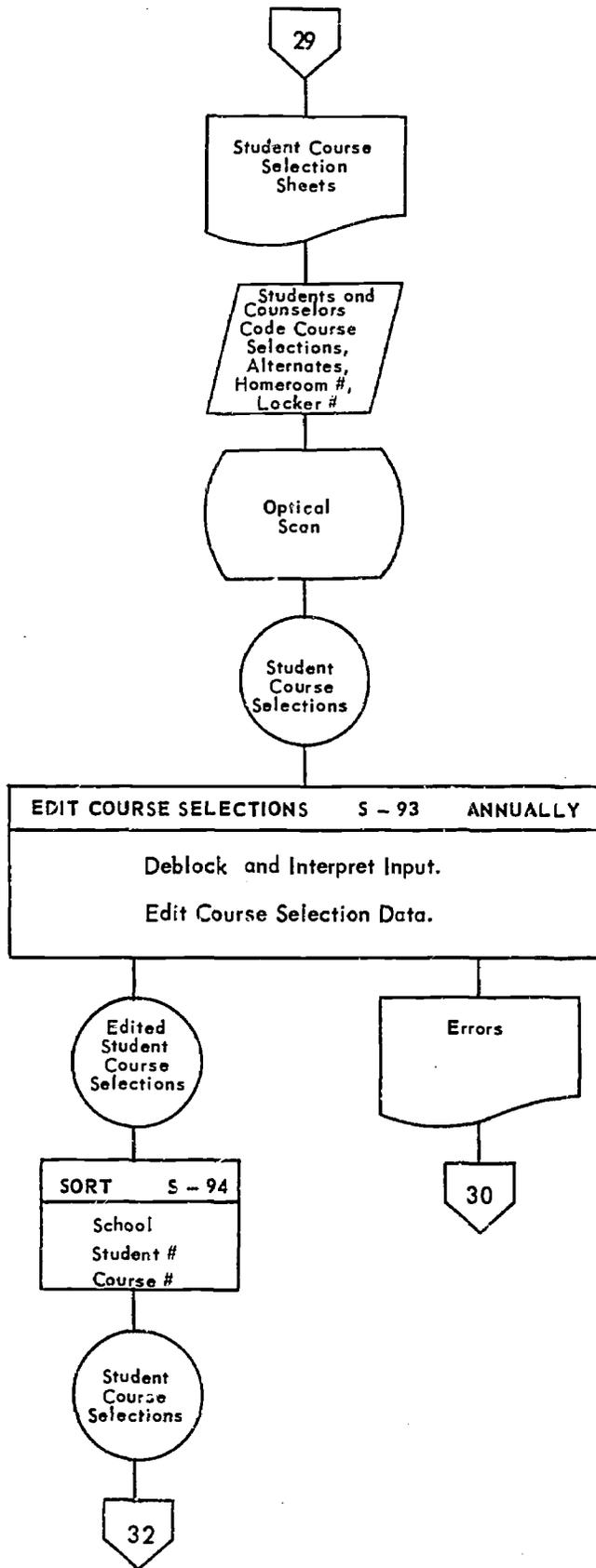


NYSEIS
STUDENT SCHEDULING

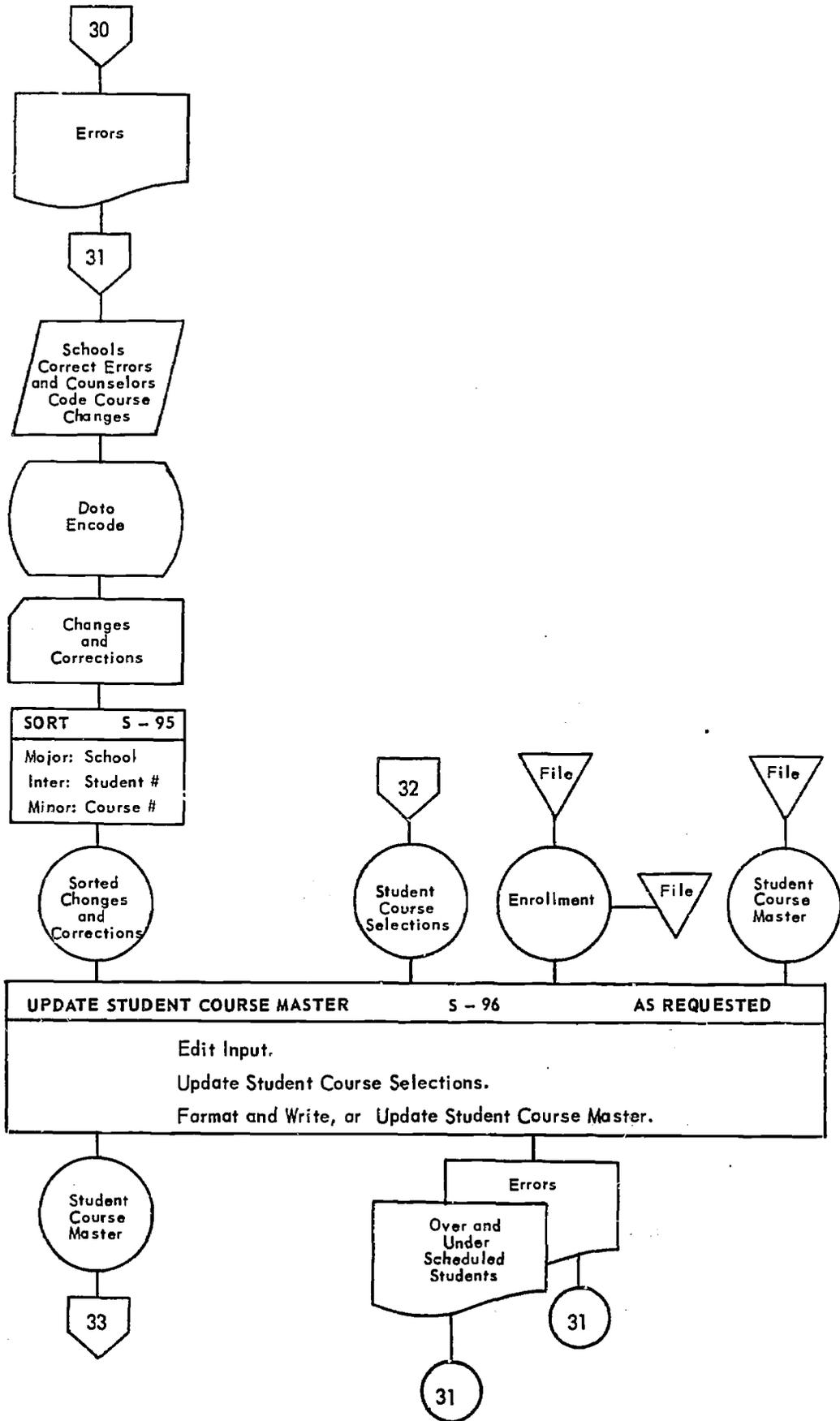




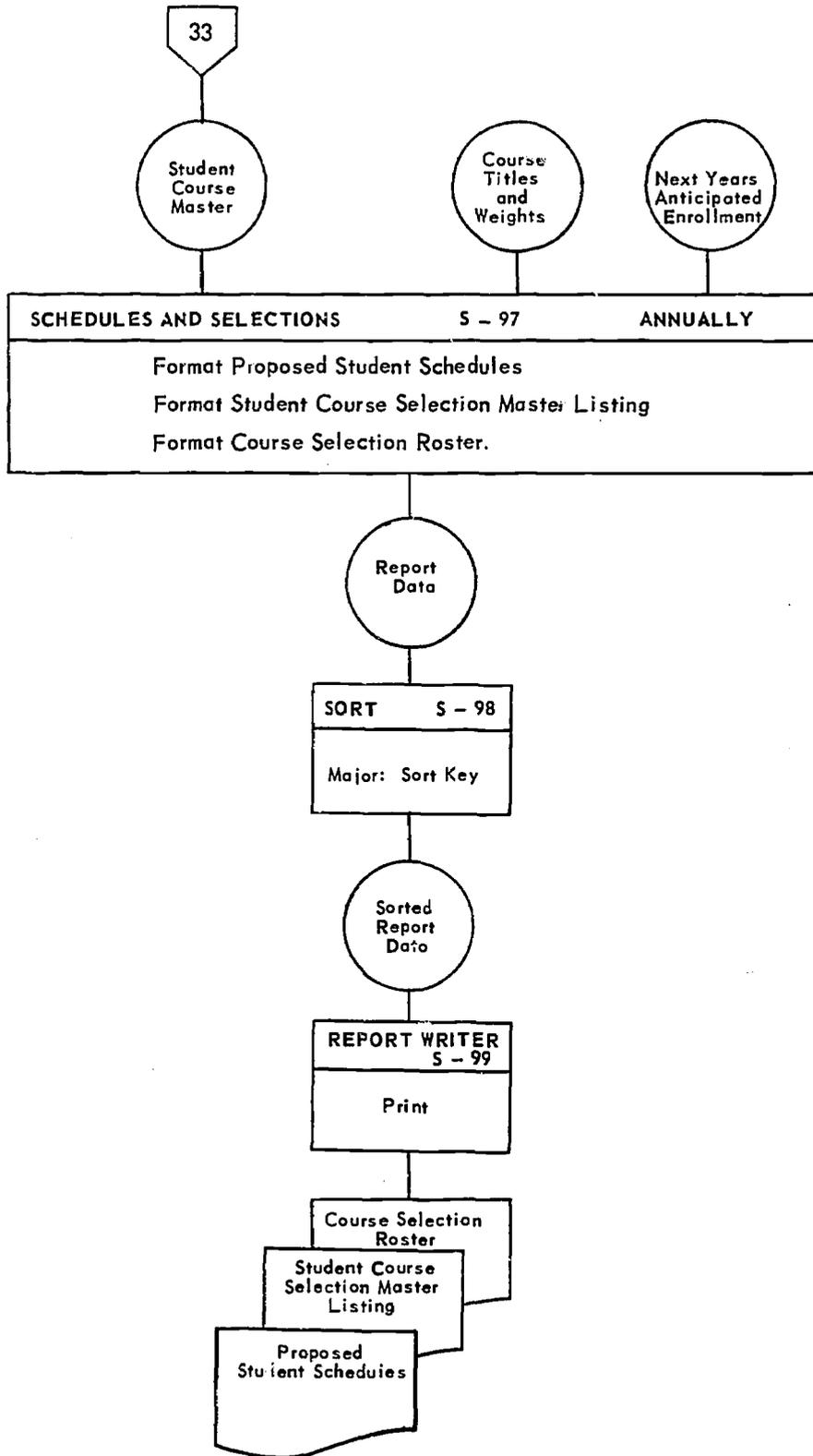
NYSEIS
STUDENT SCHEDULING



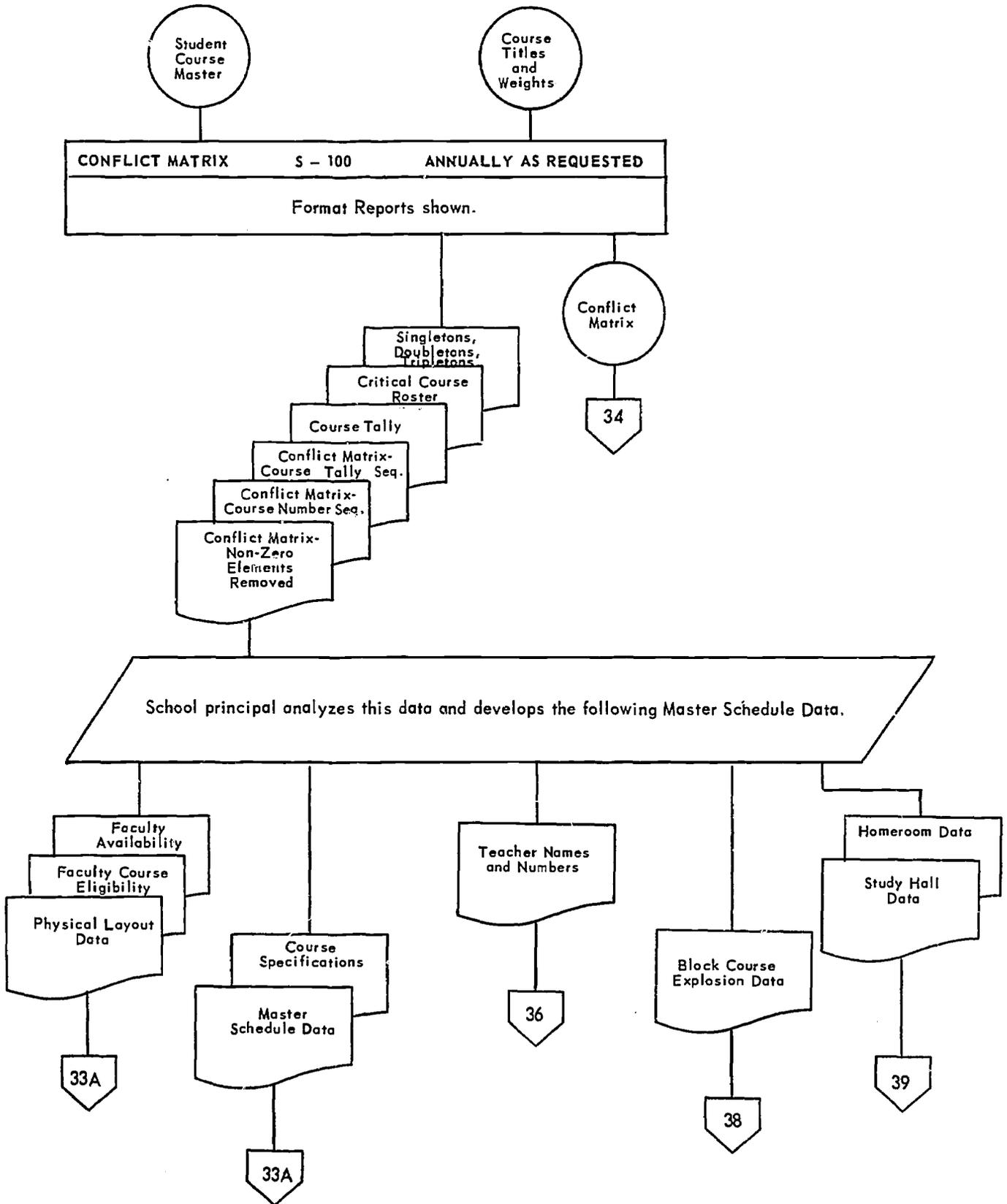
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STUDENT SCHEDULING



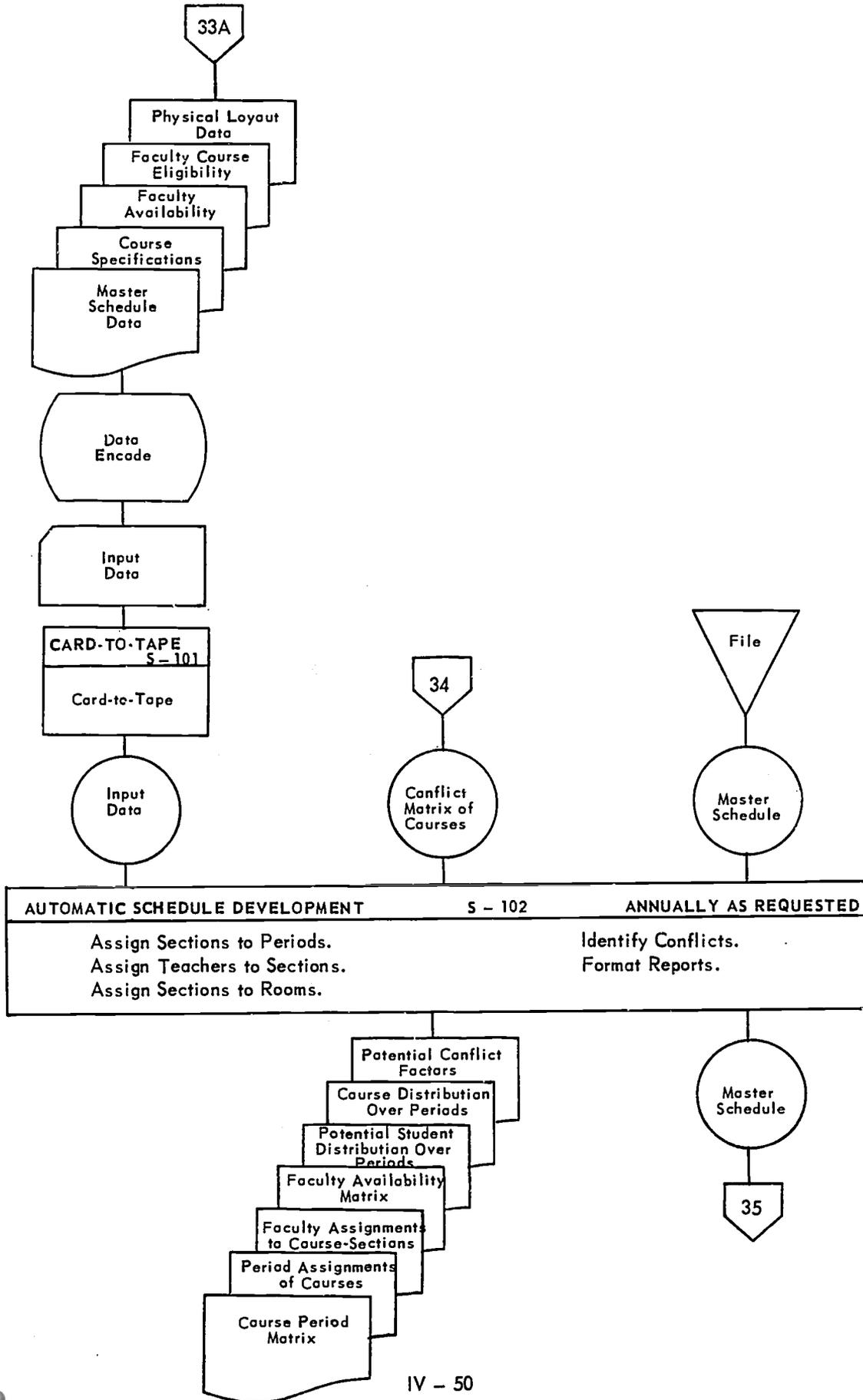
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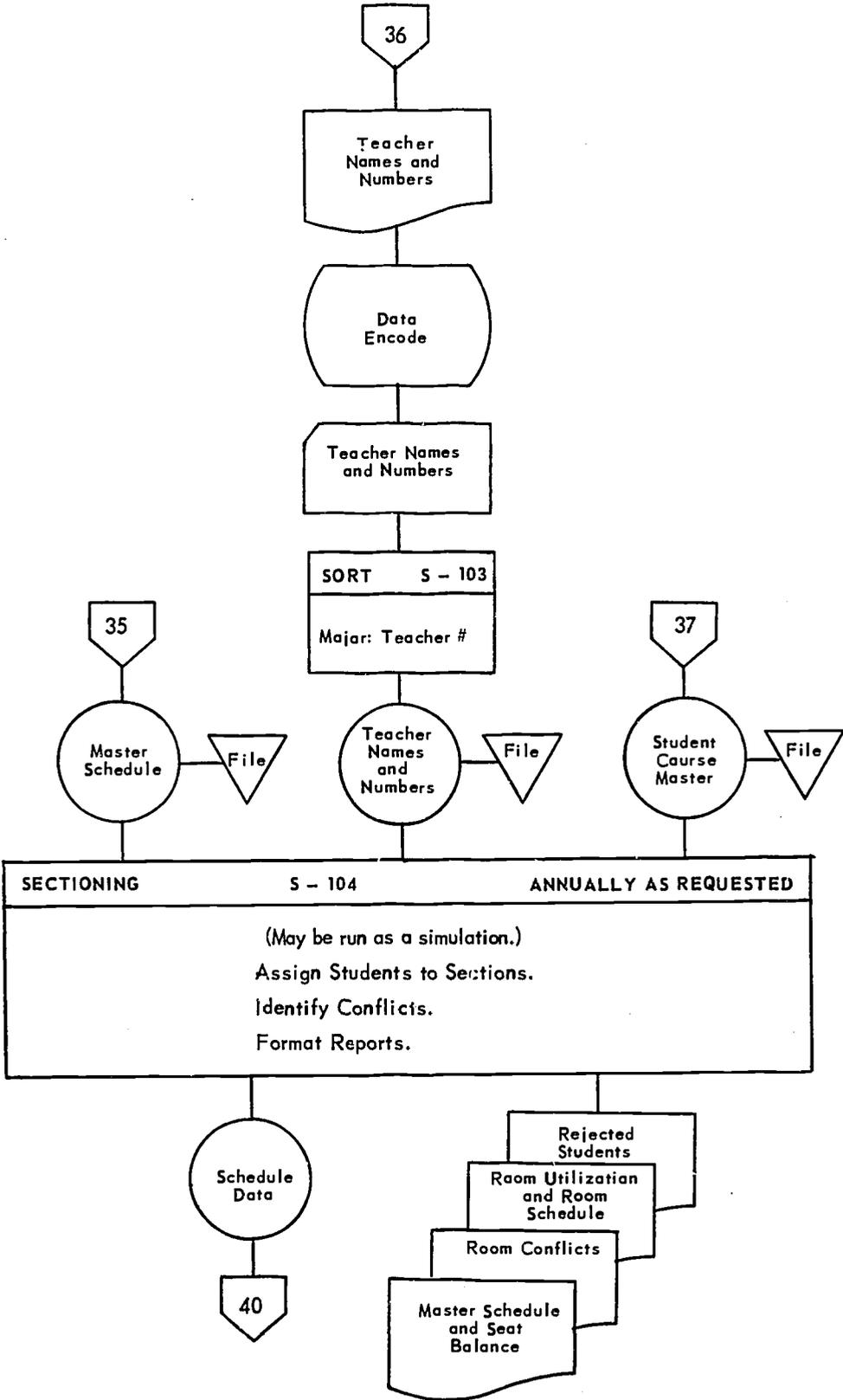


NYSEIS
SCHOOL SCHEDULING

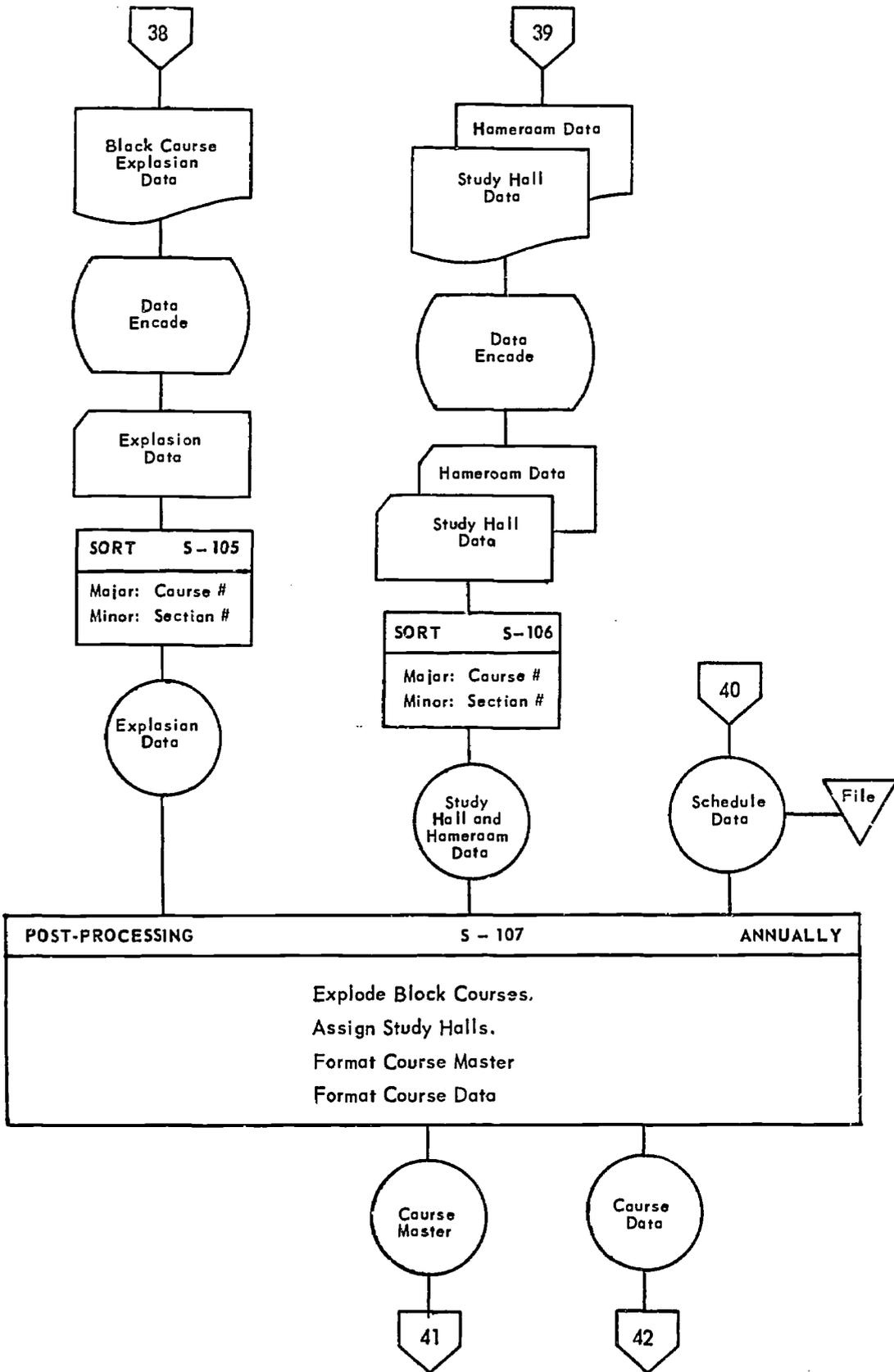


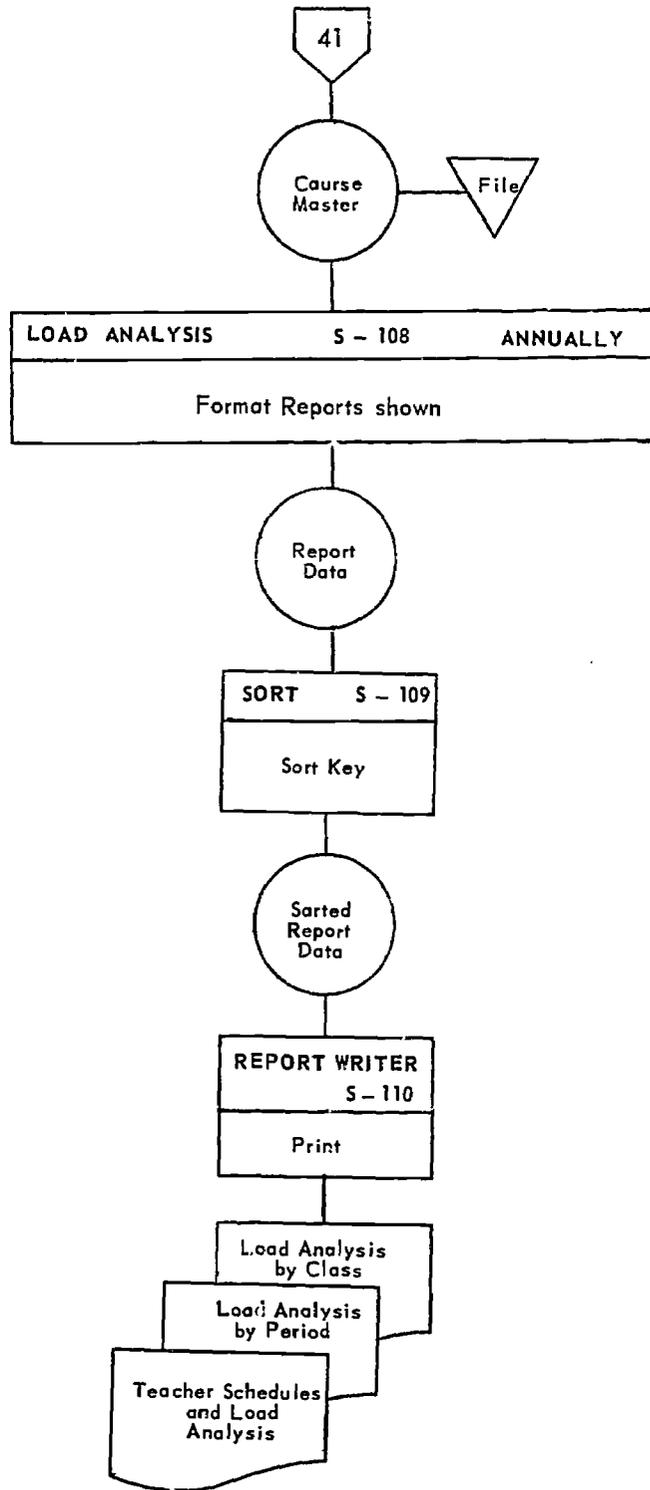
NYSEIS
STUDENT SCHEDULING



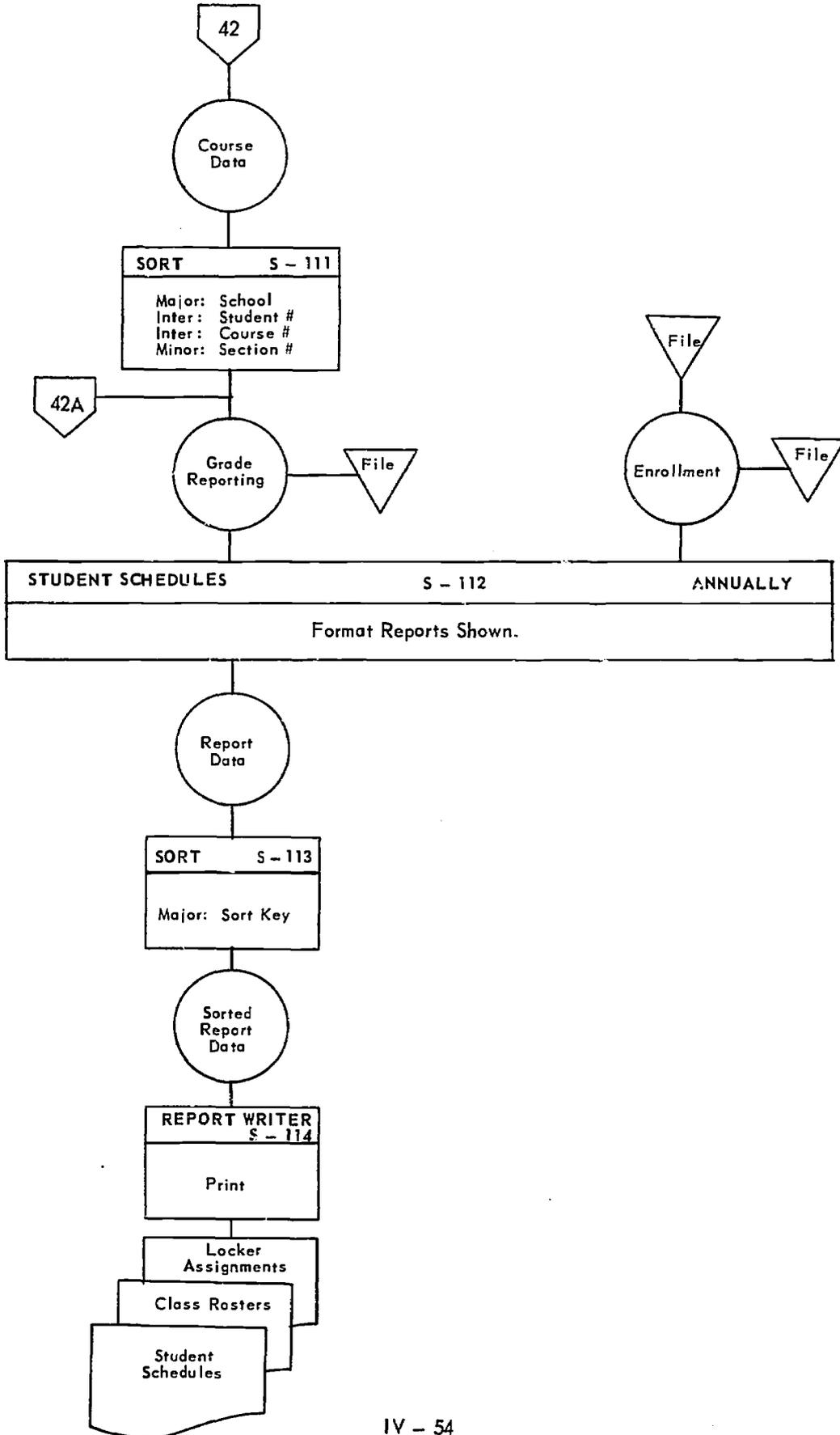


NYSEIS
STUDENT SCHEDULING





NYSEIS
STUDENT SCHEDULING

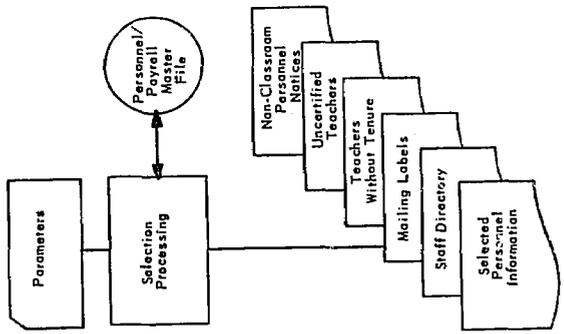
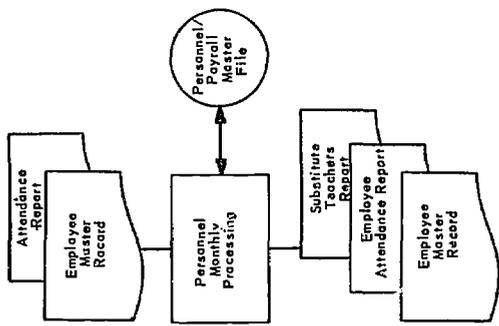
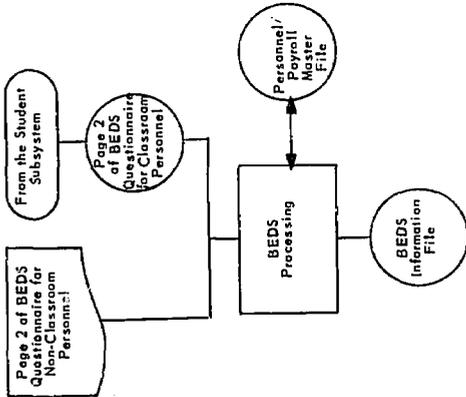
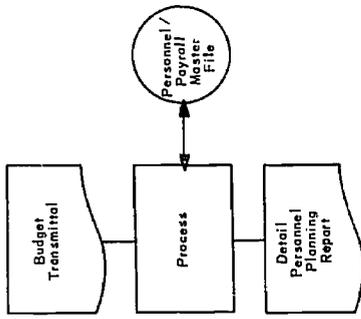
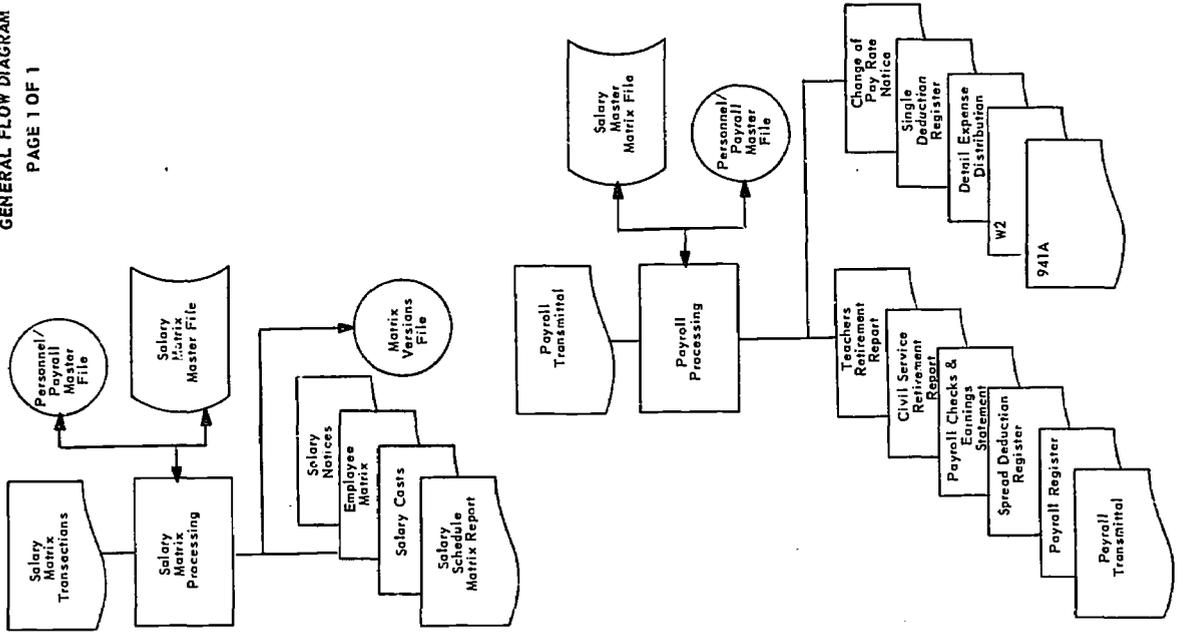


PERSONNEL

2. Personnel Subsystem

- General Flow Diagram
- Processing Flow Charts

NYSEIS
 PERSONNEL SUBSYSTEM
 GENERAL FLOW DIAGRAM
 PAGE 1 OF 1

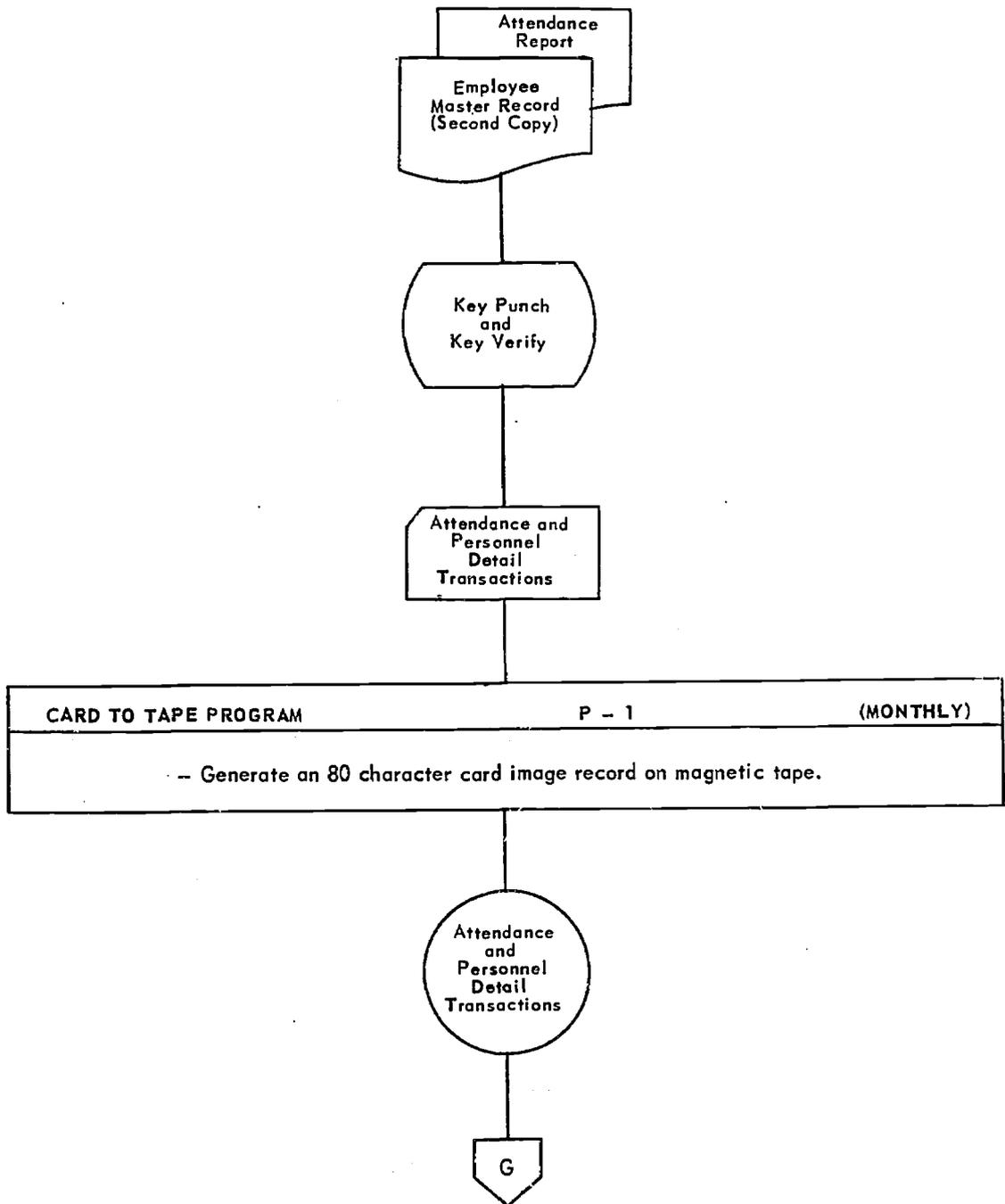


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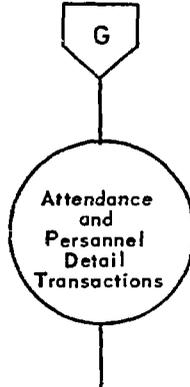
PROCESSING FLOW CHARTS:

PERSONNEL SUBSYSTEM

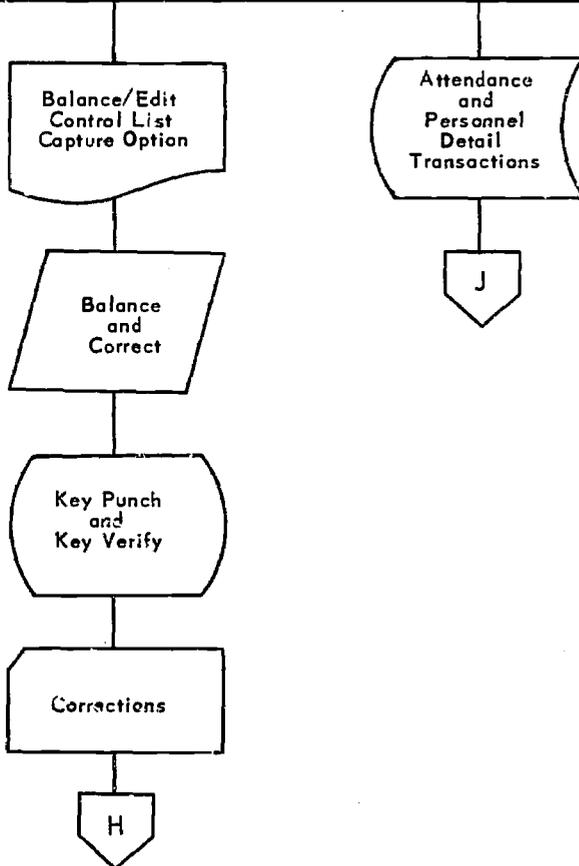
NYSEIS
PERSONNEL

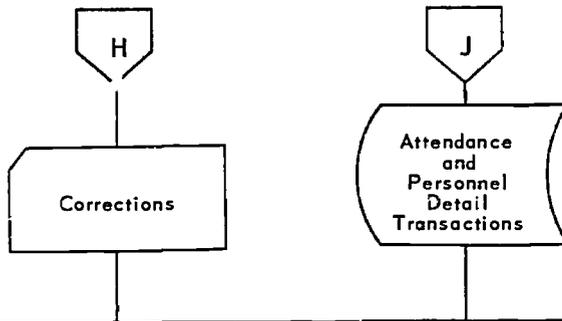


NOTE: Off page connections are alphabetic and apply to the Personnel/Payroll System only.



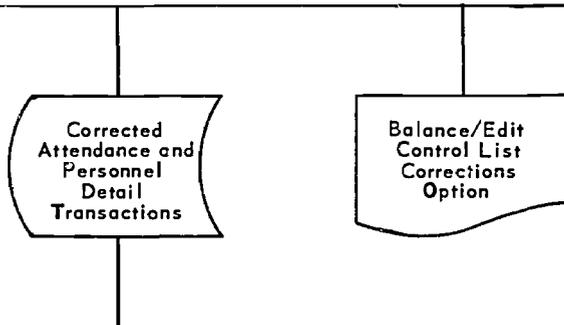
PERSONNEL BALANCE / EDIT PROGRAM, CAPTURE OPTION	P - 2	(MONTHLY)
<ul style="list-style-type: none">- Calculate check digit on employee number for additions and validate it for all other transactions.- Check all fields for invalid characters and missing informations.- Validate all codes by consulting tables.- Accumulate control totals.- Write the Personnel Detail Transaction File with each transaction sequentially numbered and flag all invalid records.- Print Balance/Edit Control List, capture option with control totals and show each transaction with coded error messages indicating where the transaction has failed to meet the edit criteria.		





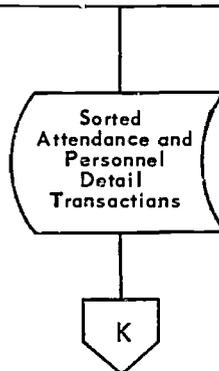
PERSONNEL BALANCE / EDIT PROGRAM, CORRECTIONS OPTION P - 3 (MONTHLY)

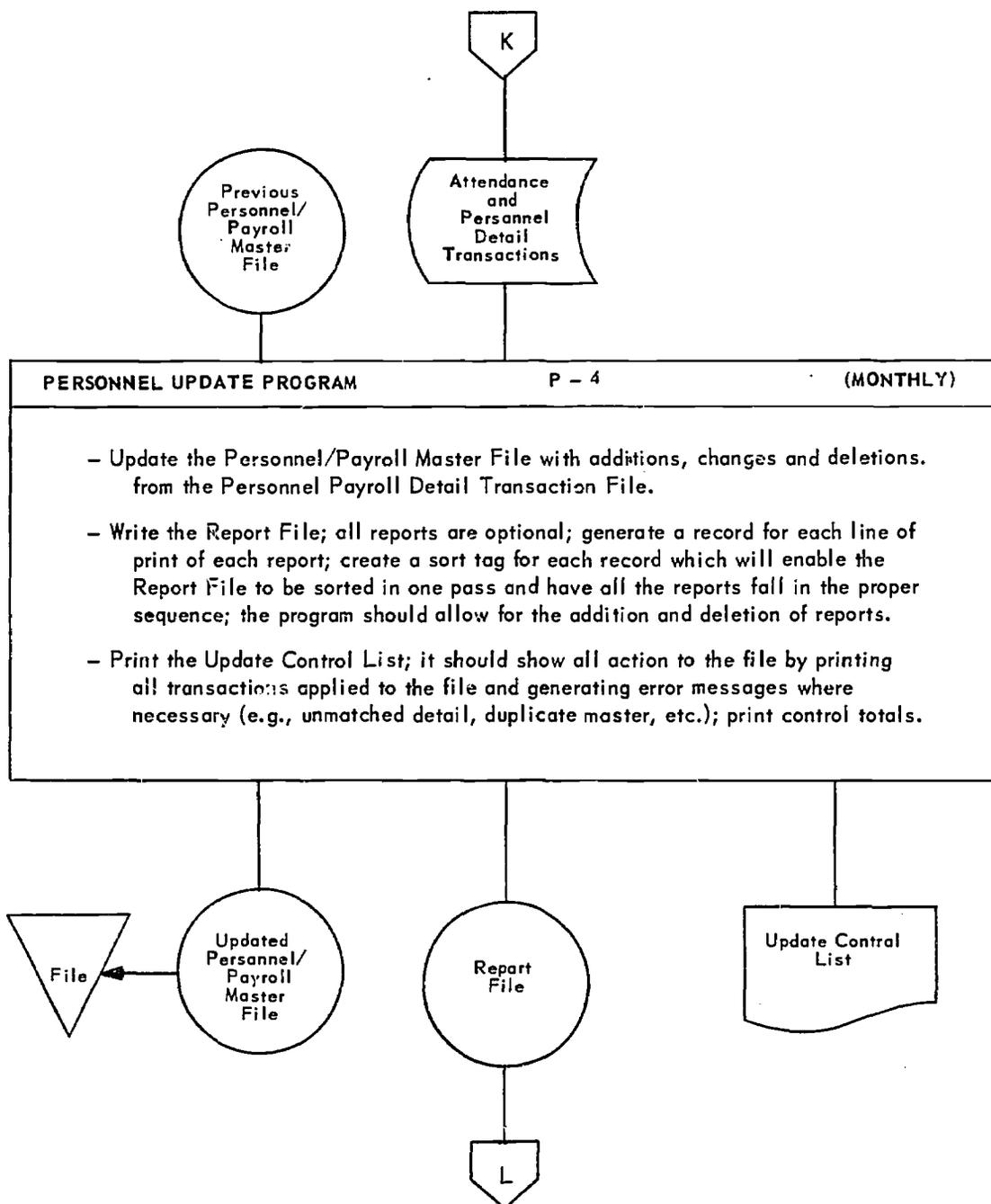
- Process each correction transaction through all routines described in the "Capture Option".
- Apply the edited corrections to the Attendance and Personal Detail Transaction File.
- Print the Balance/Edit Control List, Corrections Option, which is basically the same as the "Capture Option" except that it also shows which transactions were corrected and flags any transaction which should have been corrected and was not.
- The correction routine should be repeated until all transactions are acceptable to the system.

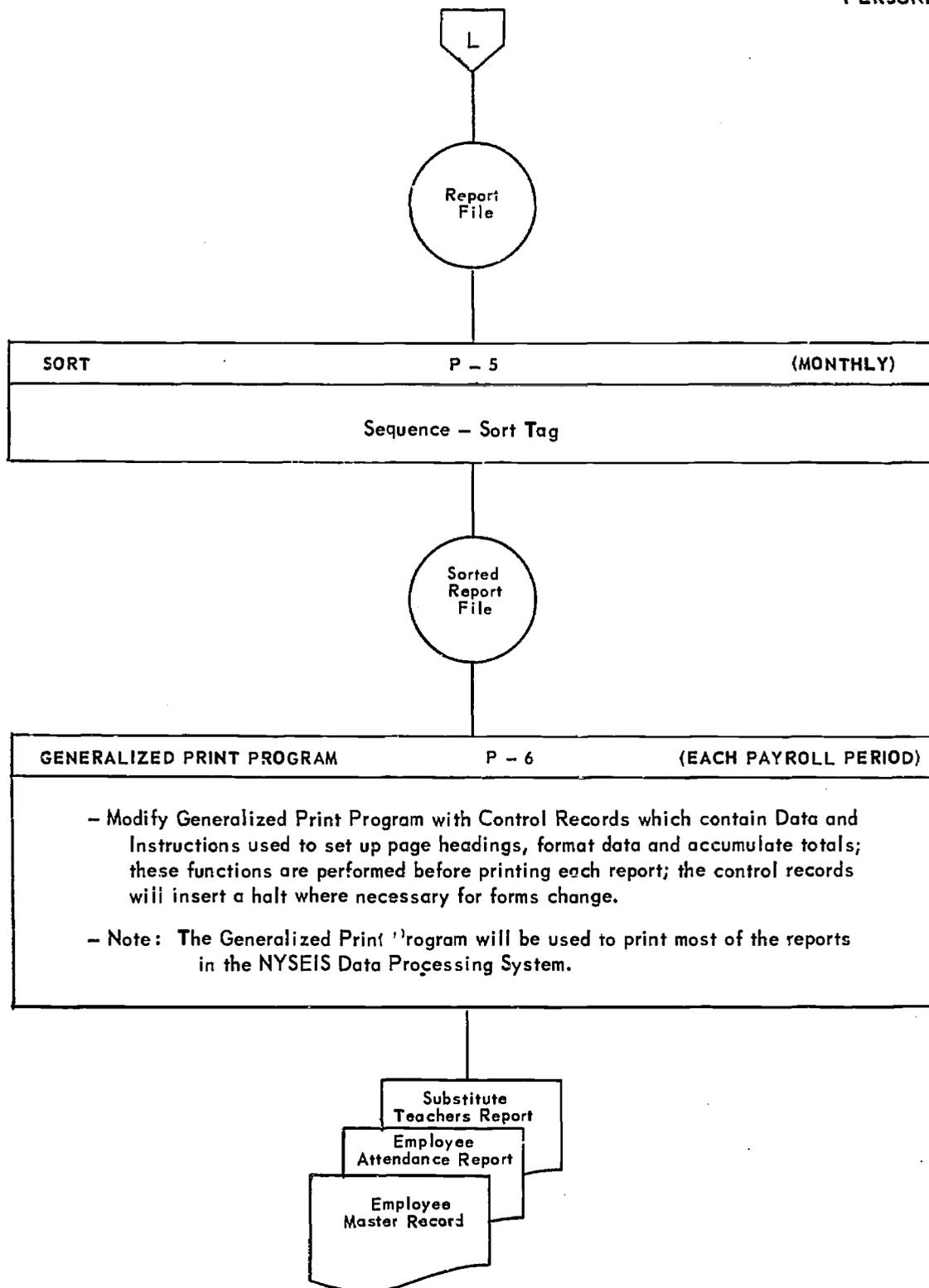


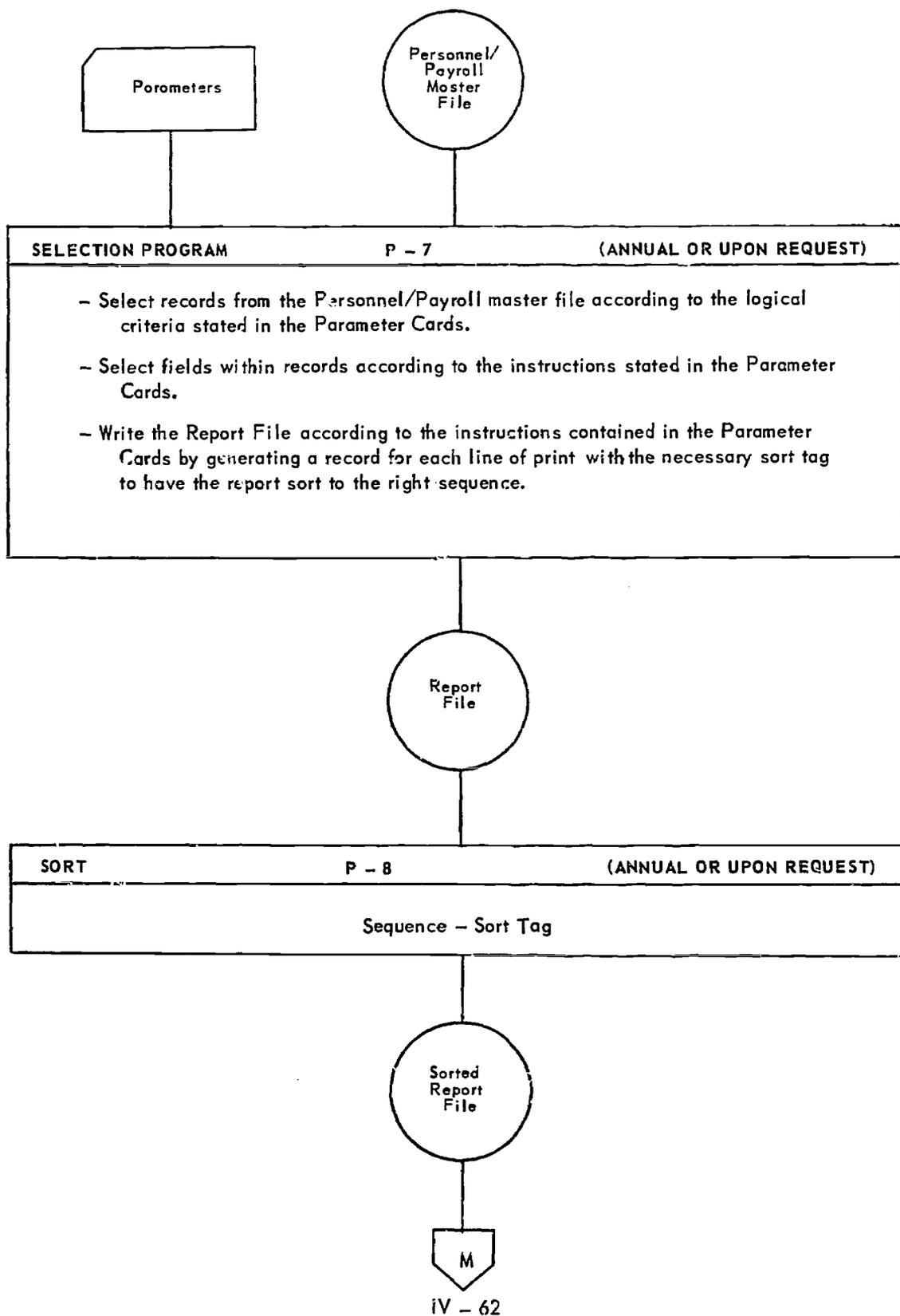
SORT (MONTHLY)

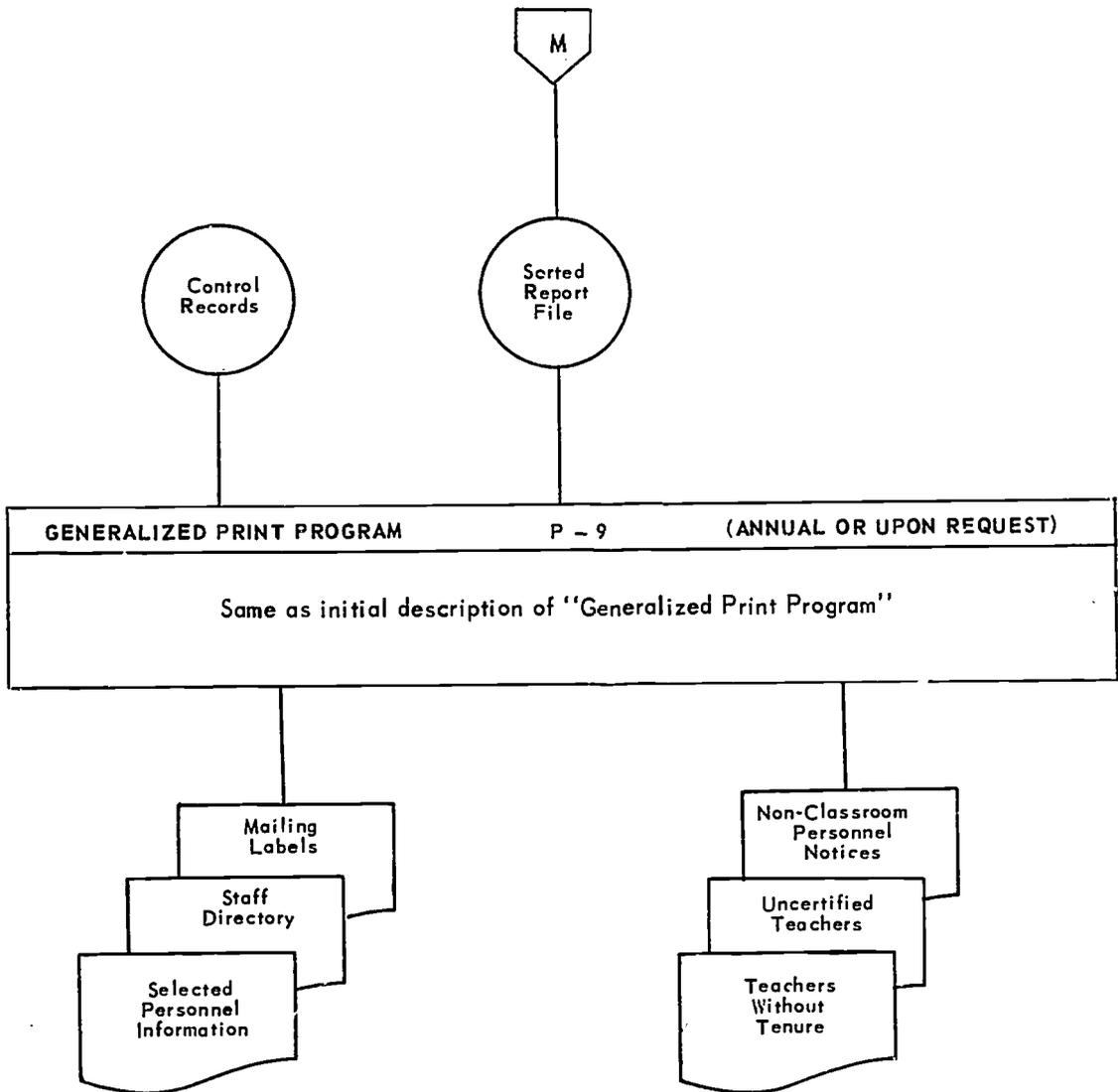
Maj. - Employee Number
Min. - Transaction Code

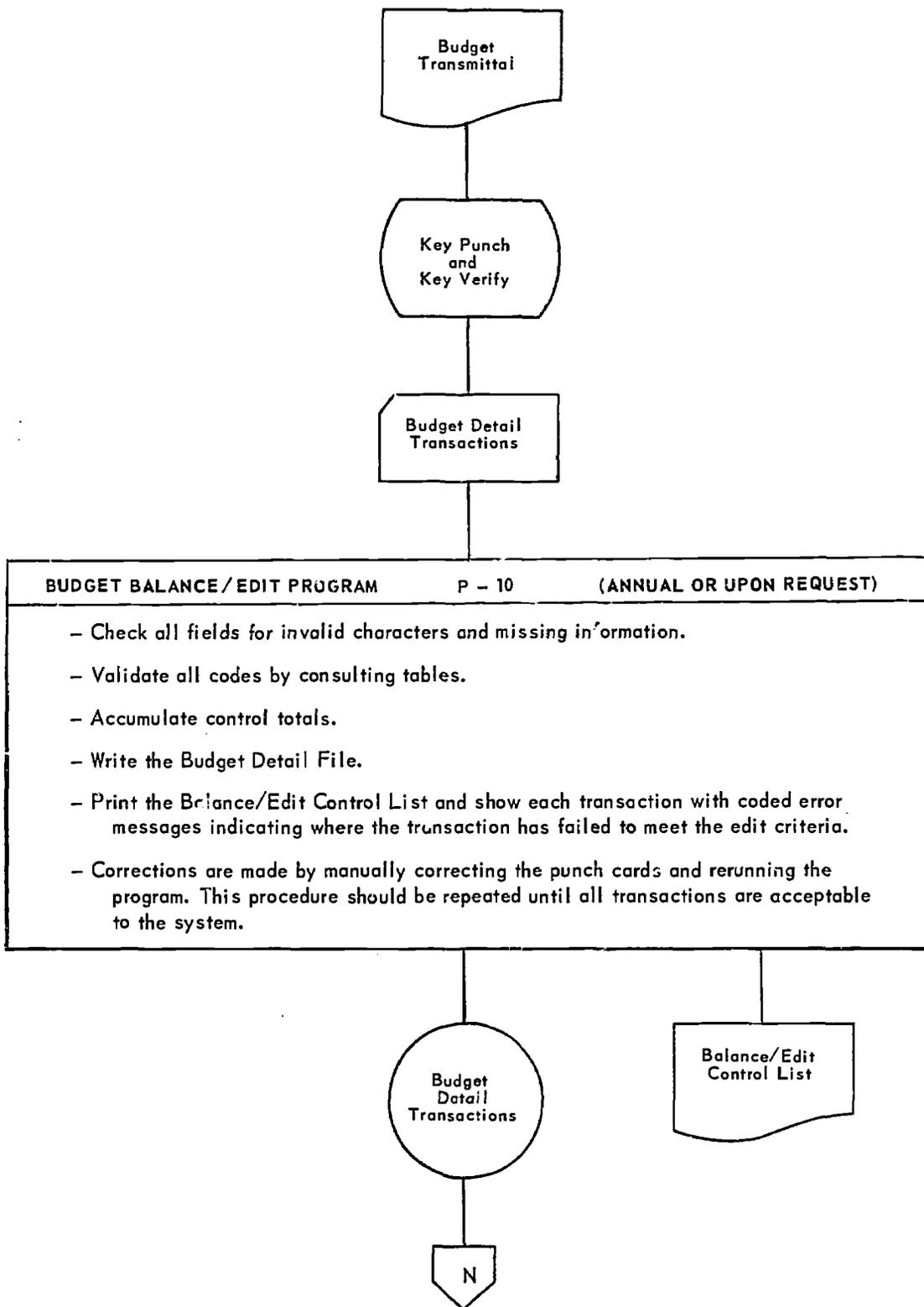


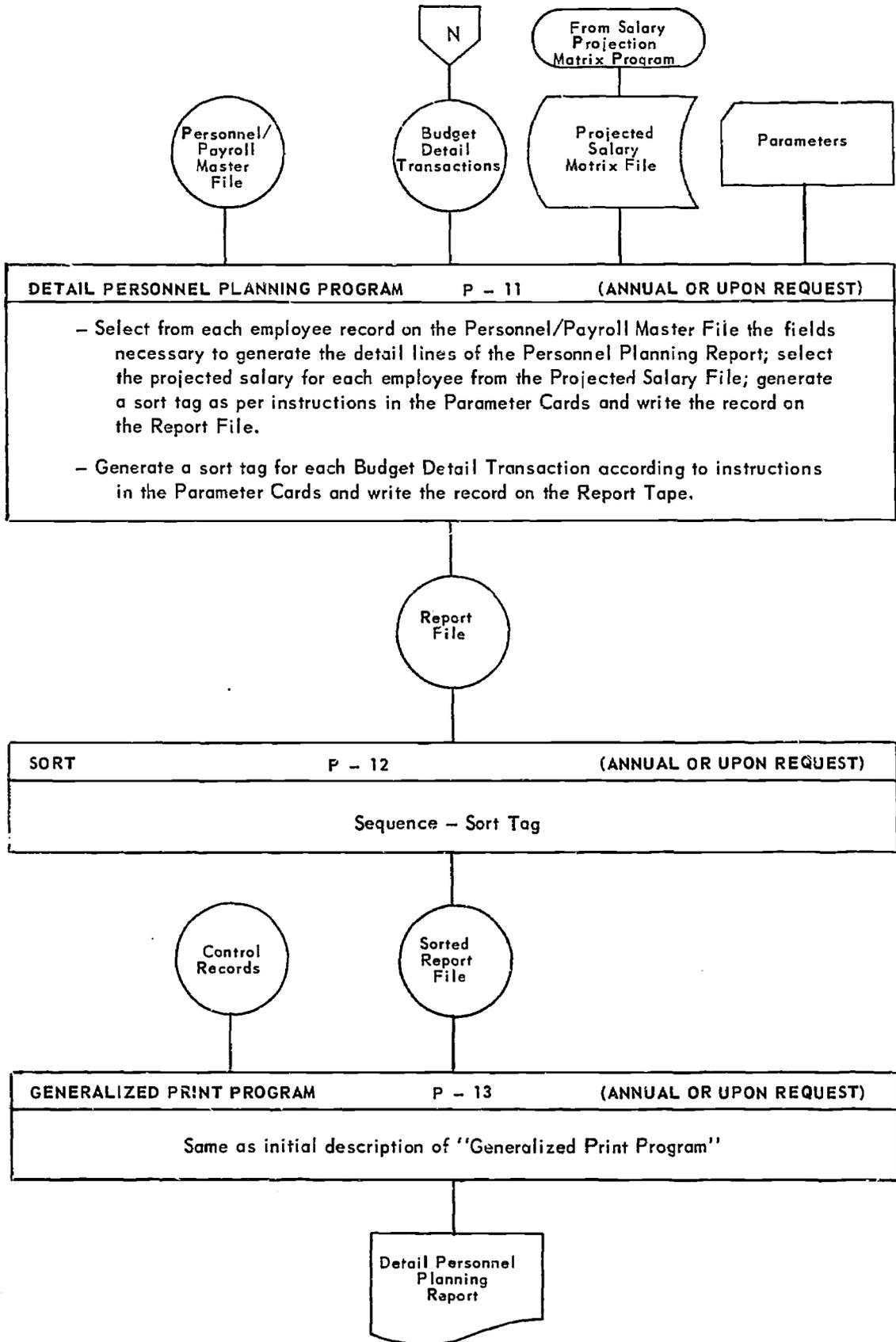


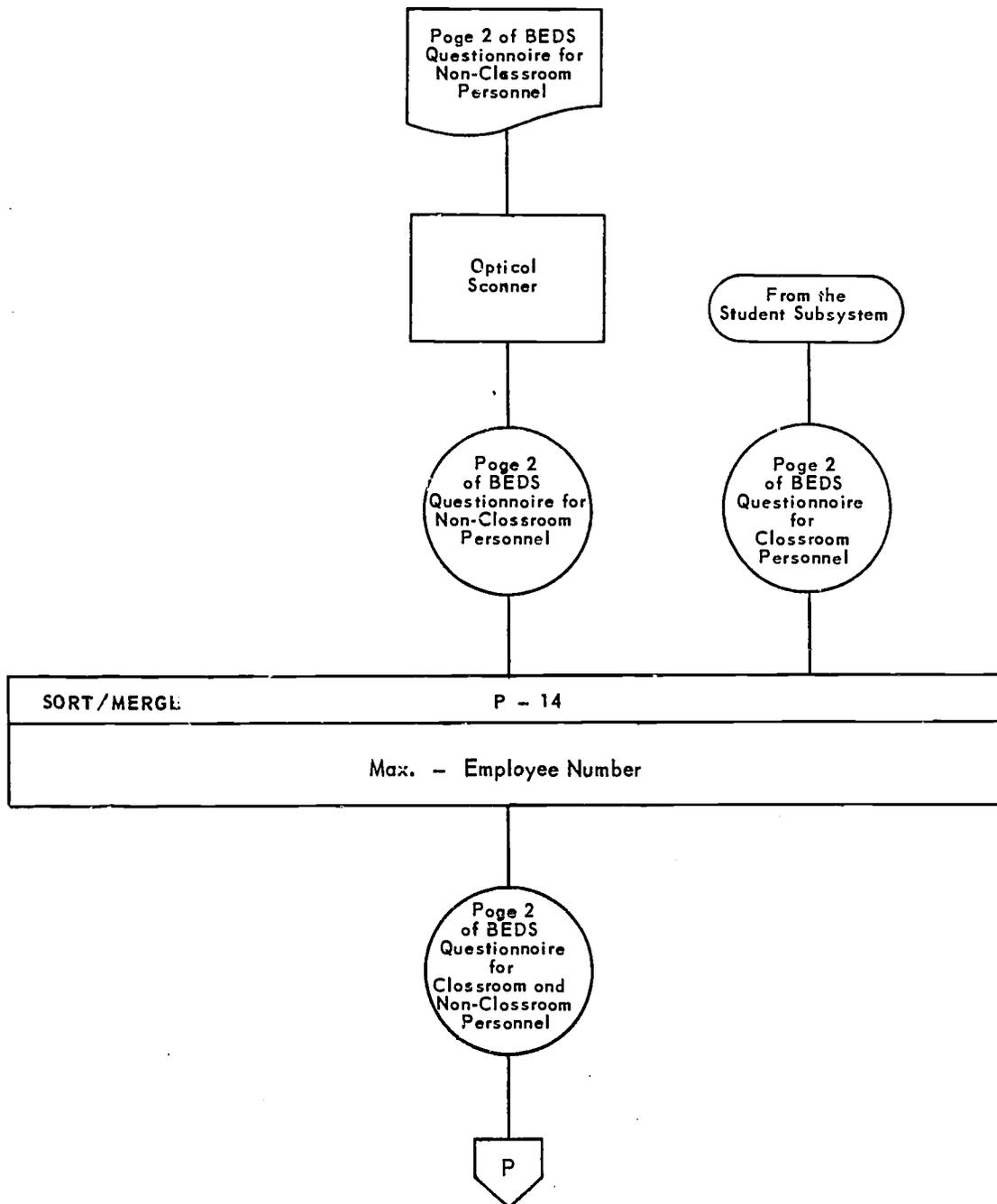


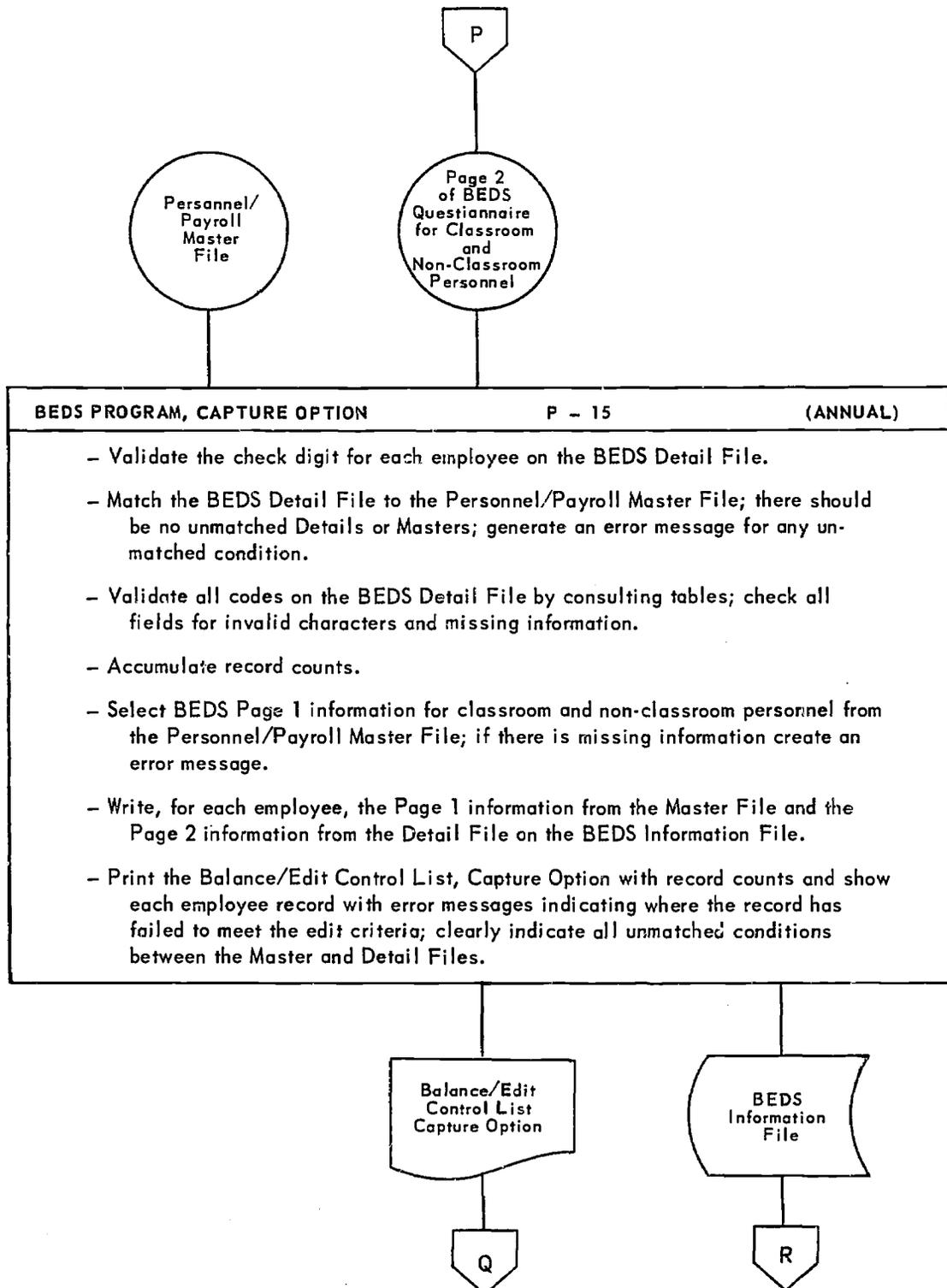


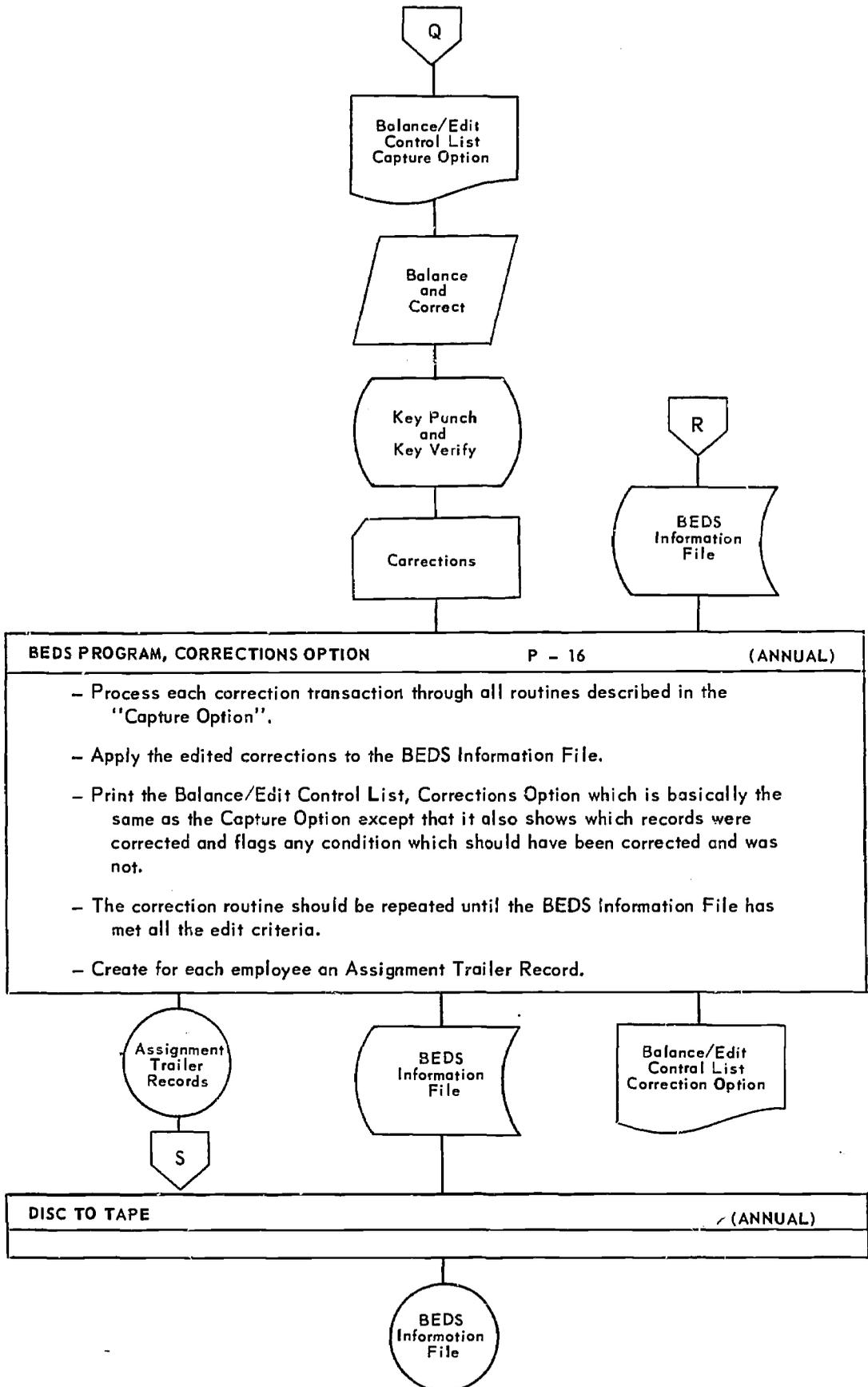


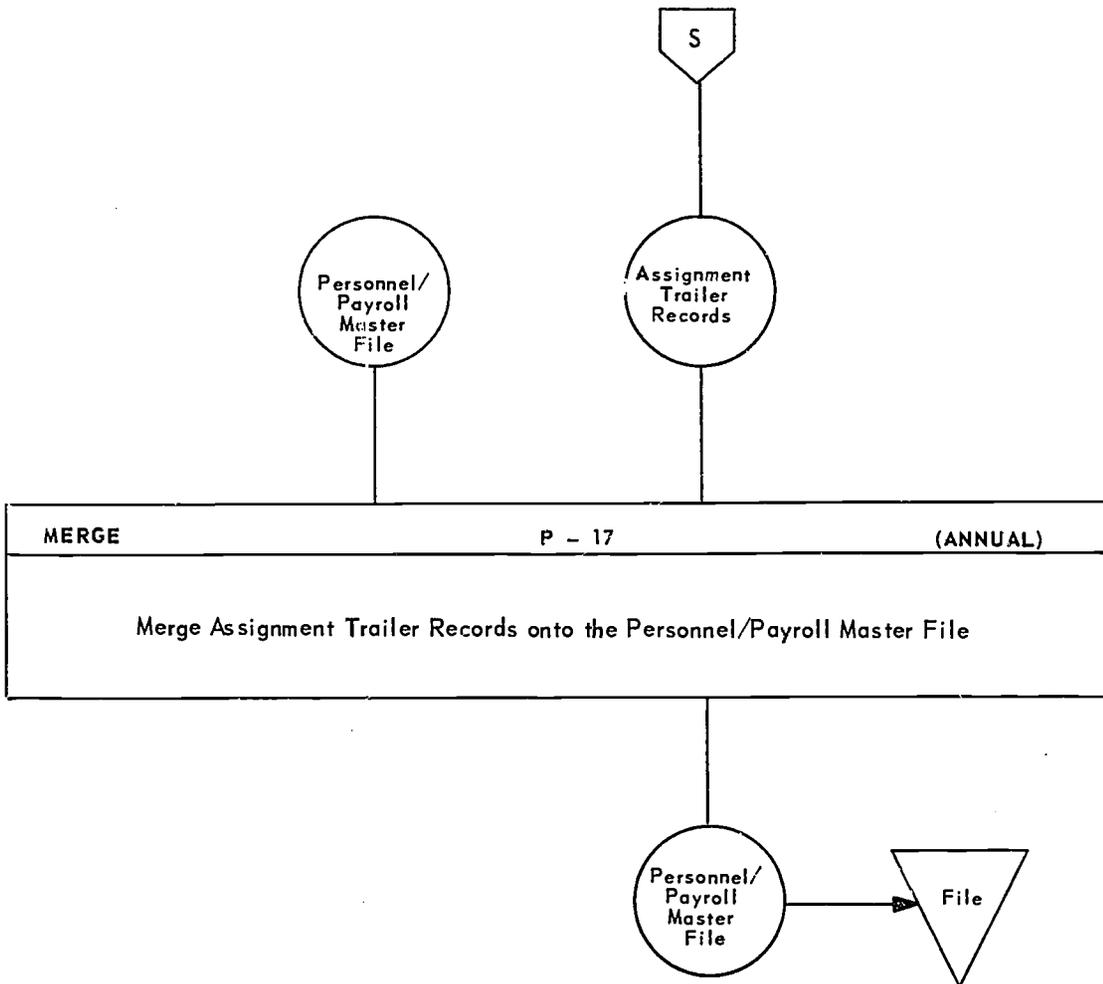


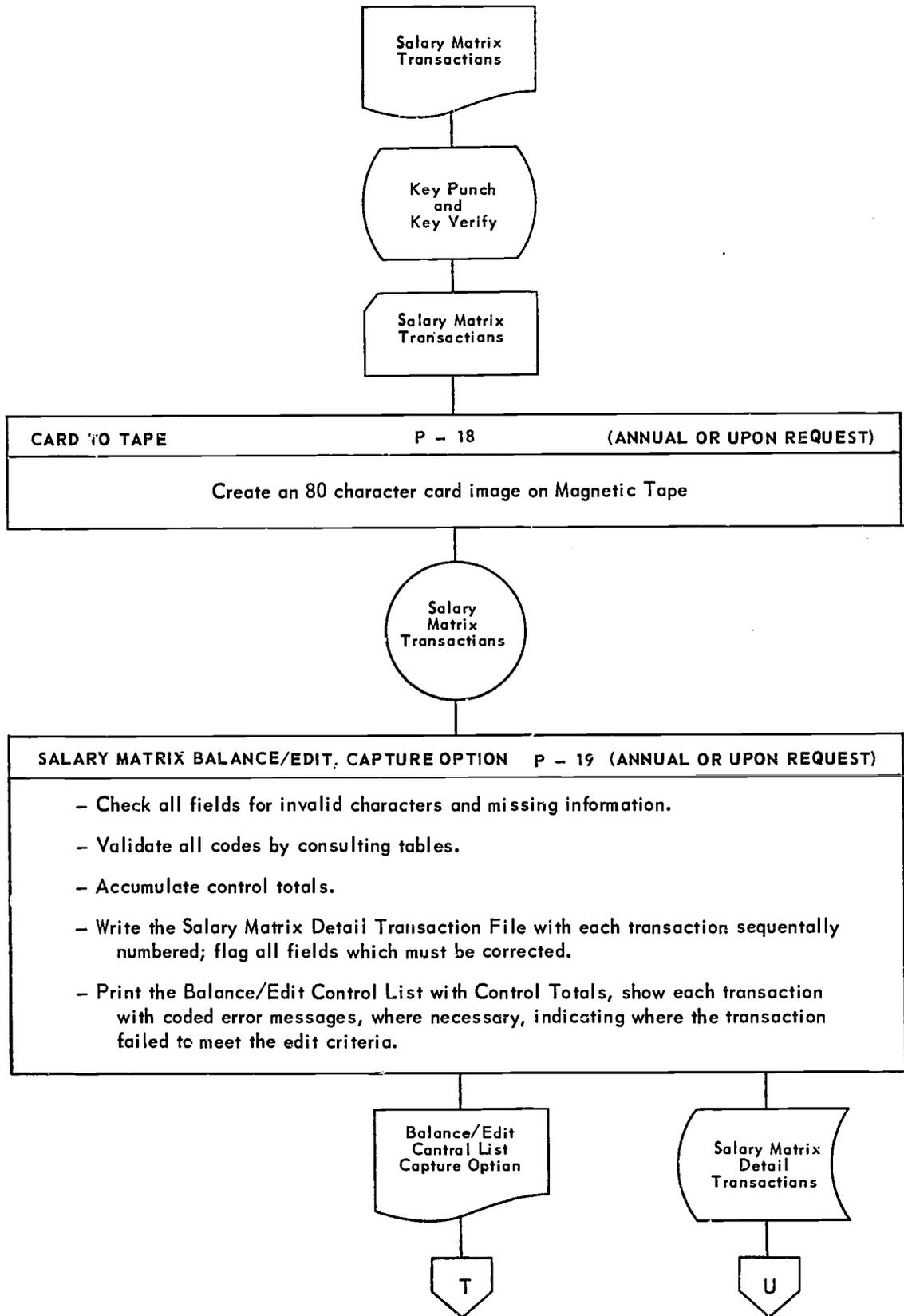


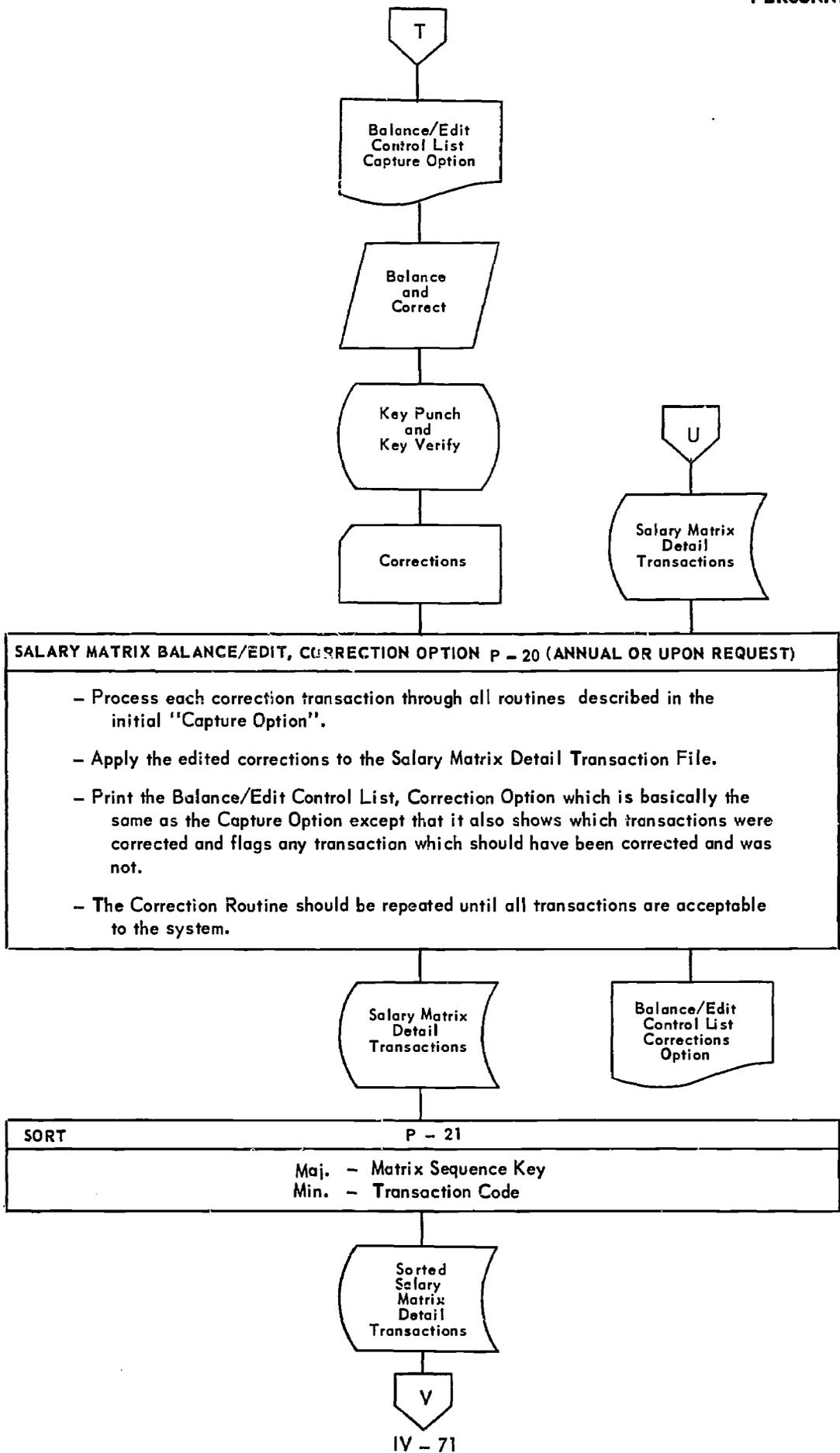










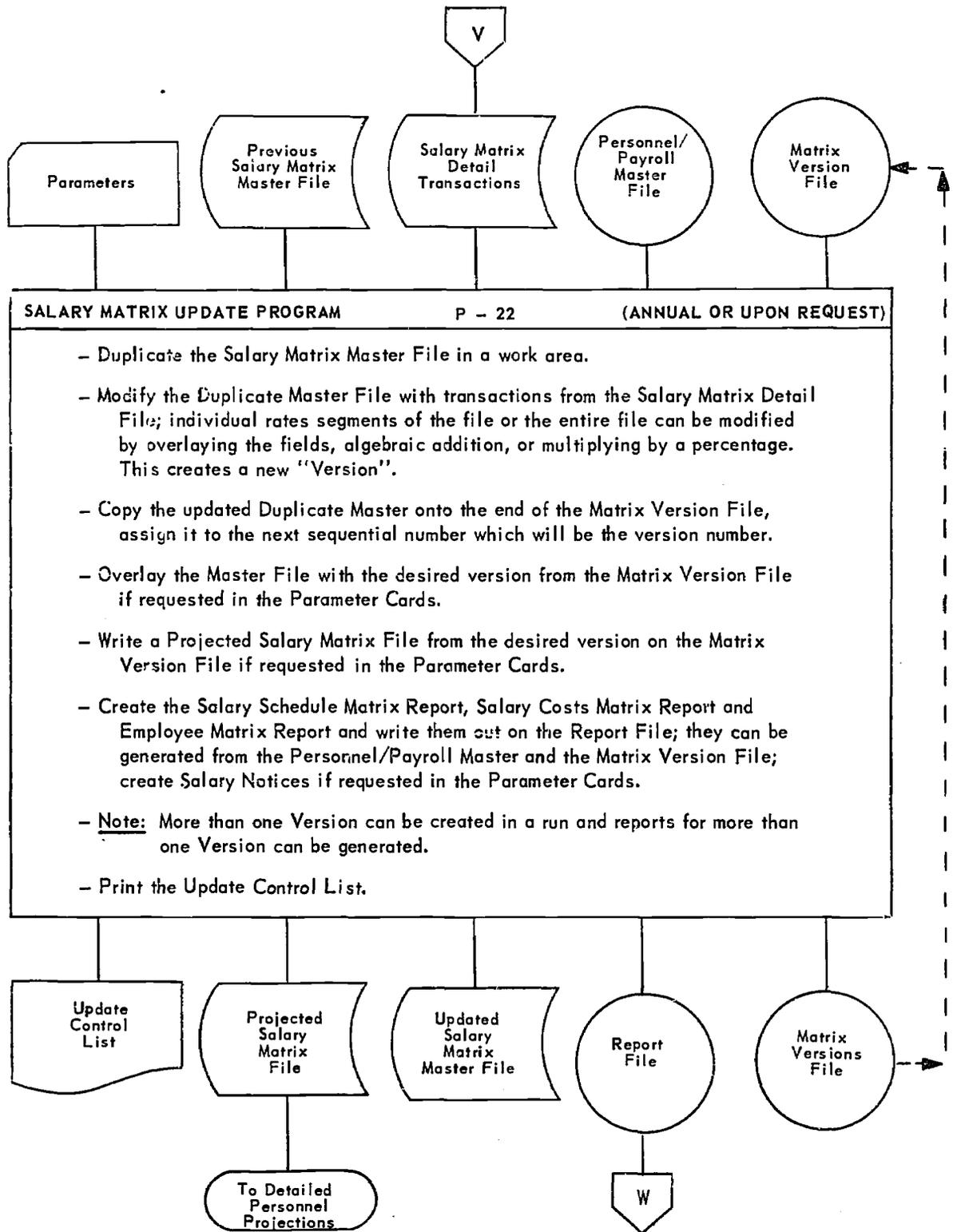


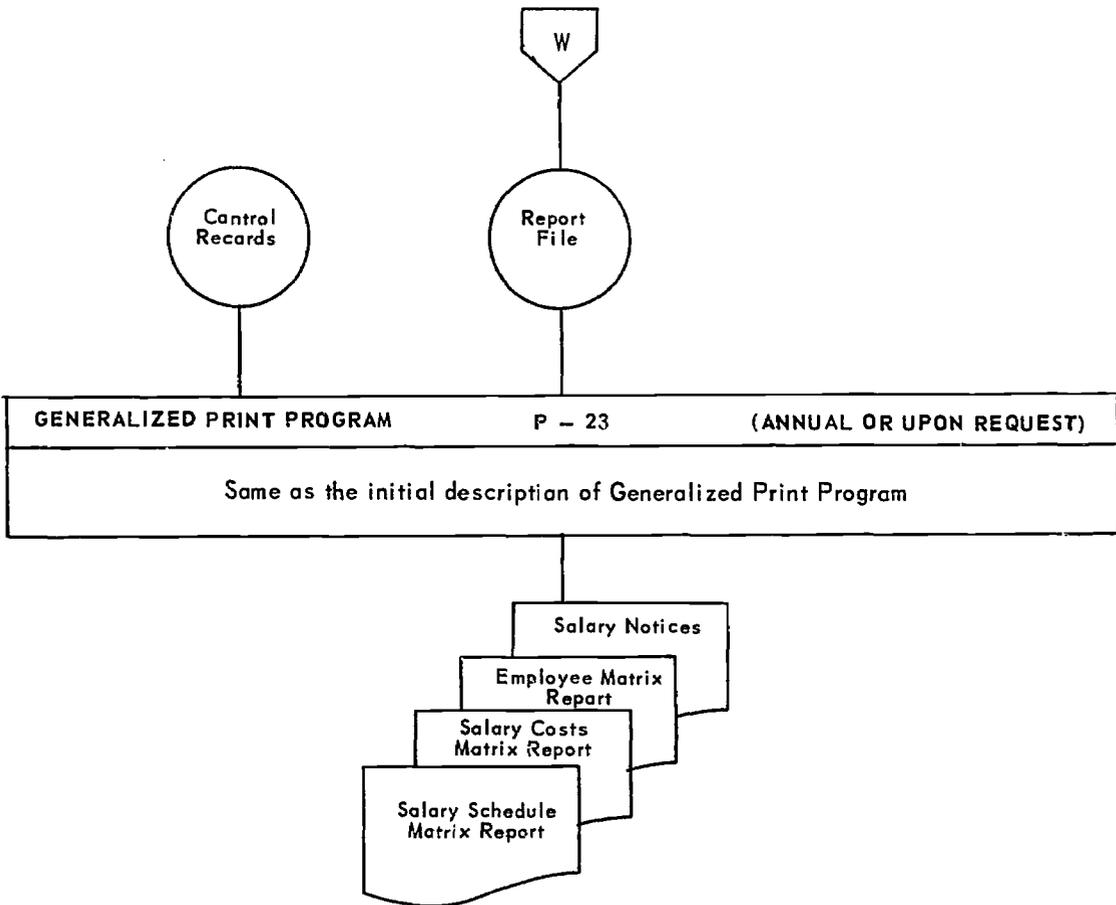
SALARY MATRIX BALANCE/EDIT, CORRECTION OPTION P - 20 (ANNUAL OR UPON REQUEST)

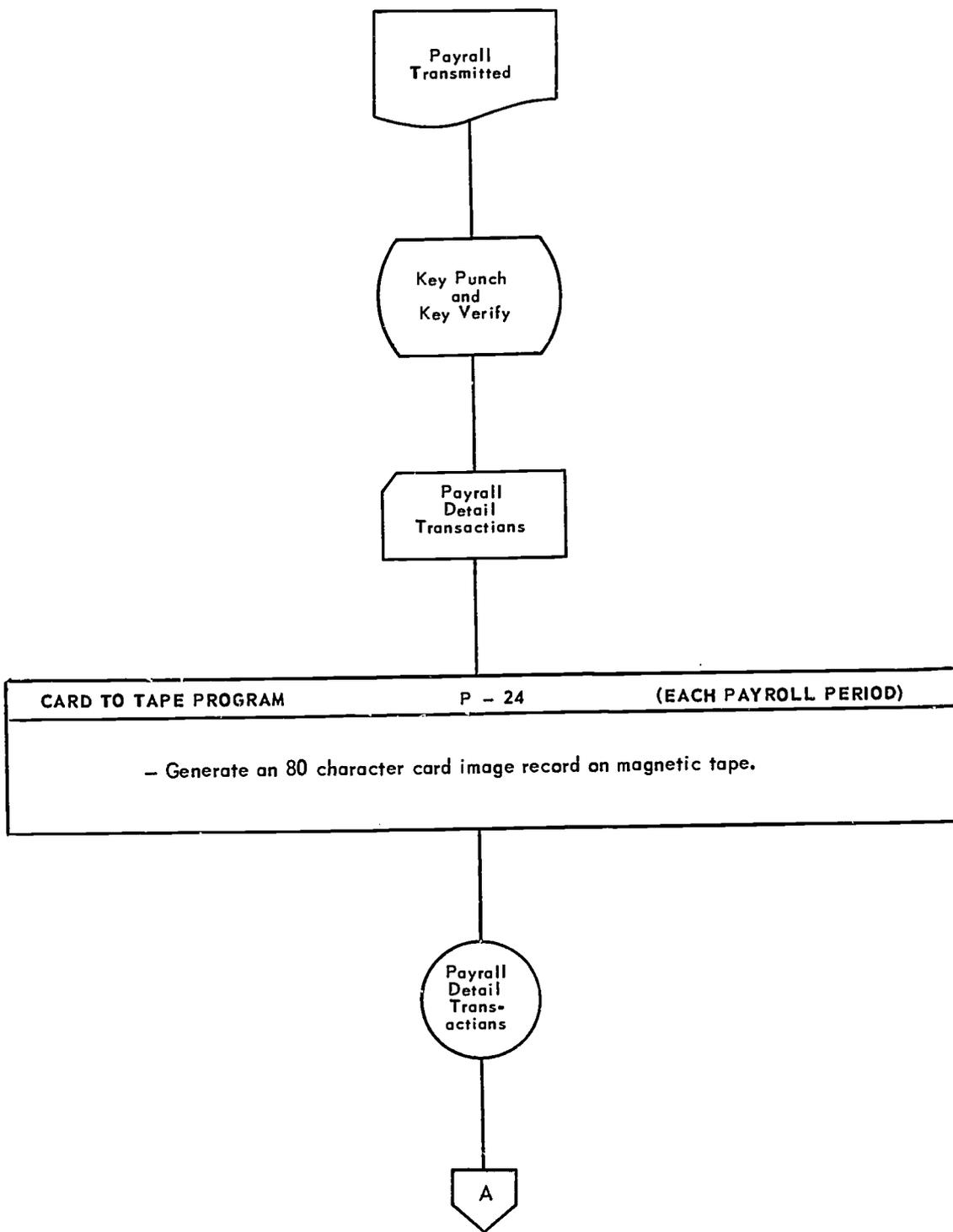
- Process each correction transaction through all routines described in the initial "Capture Option".
- Apply the edited corrections to the Salary Matrix Detail Transaction File.
- Print the Balance/Edit Control List, Correction Option which is basically the same as the Capture Option except that it also shows which transactions were corrected and flags any transaction which should have been corrected and was not.
- The Correction Routine should be repeated until all transactions are acceptable to the system.

SORT P - 21

Maj. - Matrix Sequence Key
Min. - Transaction Code



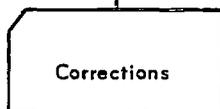
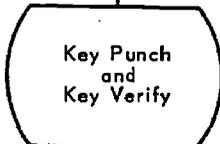
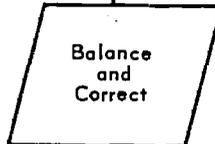
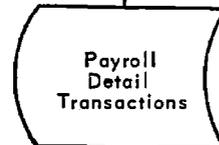
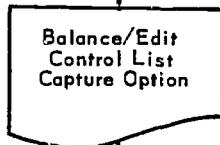


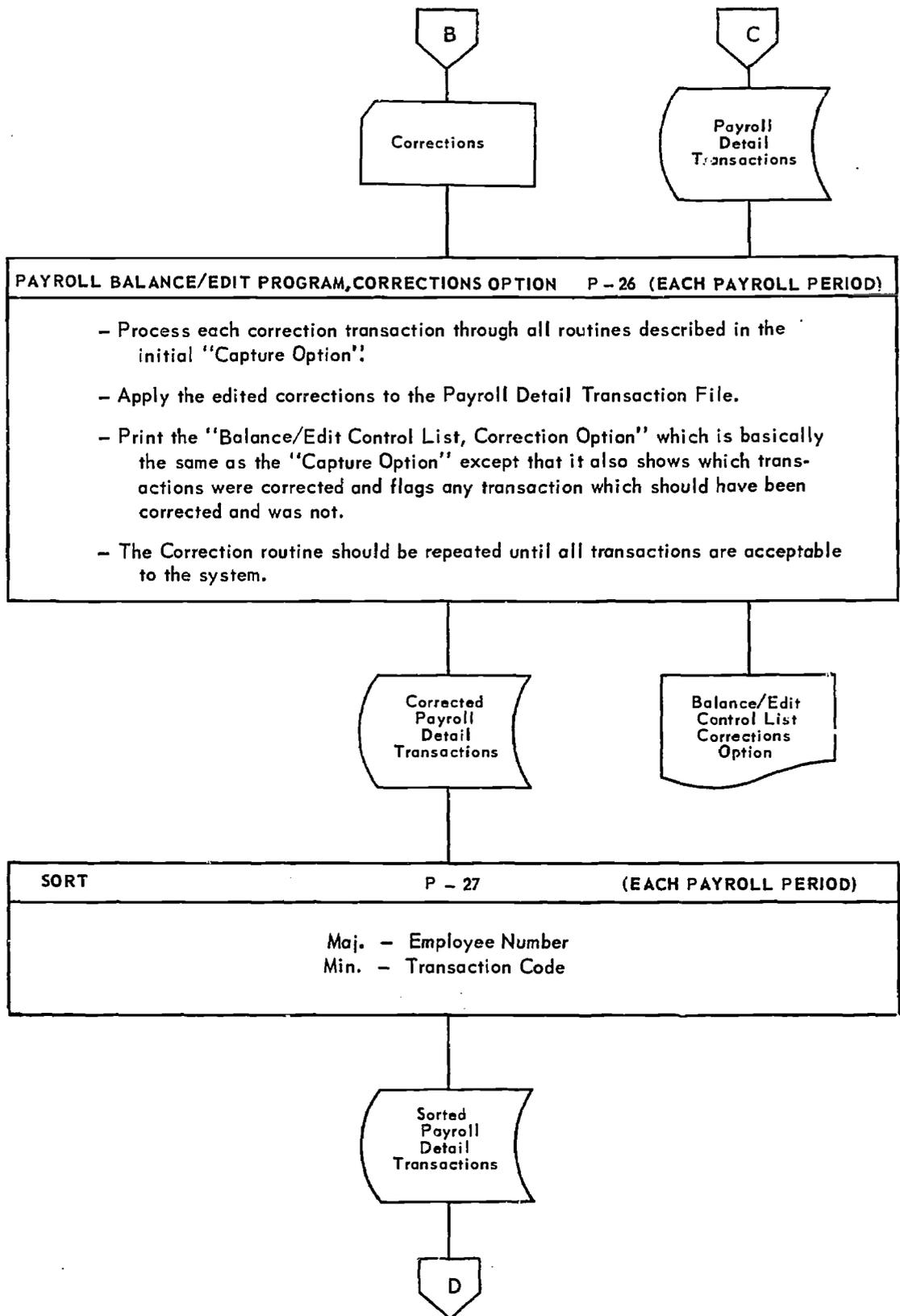


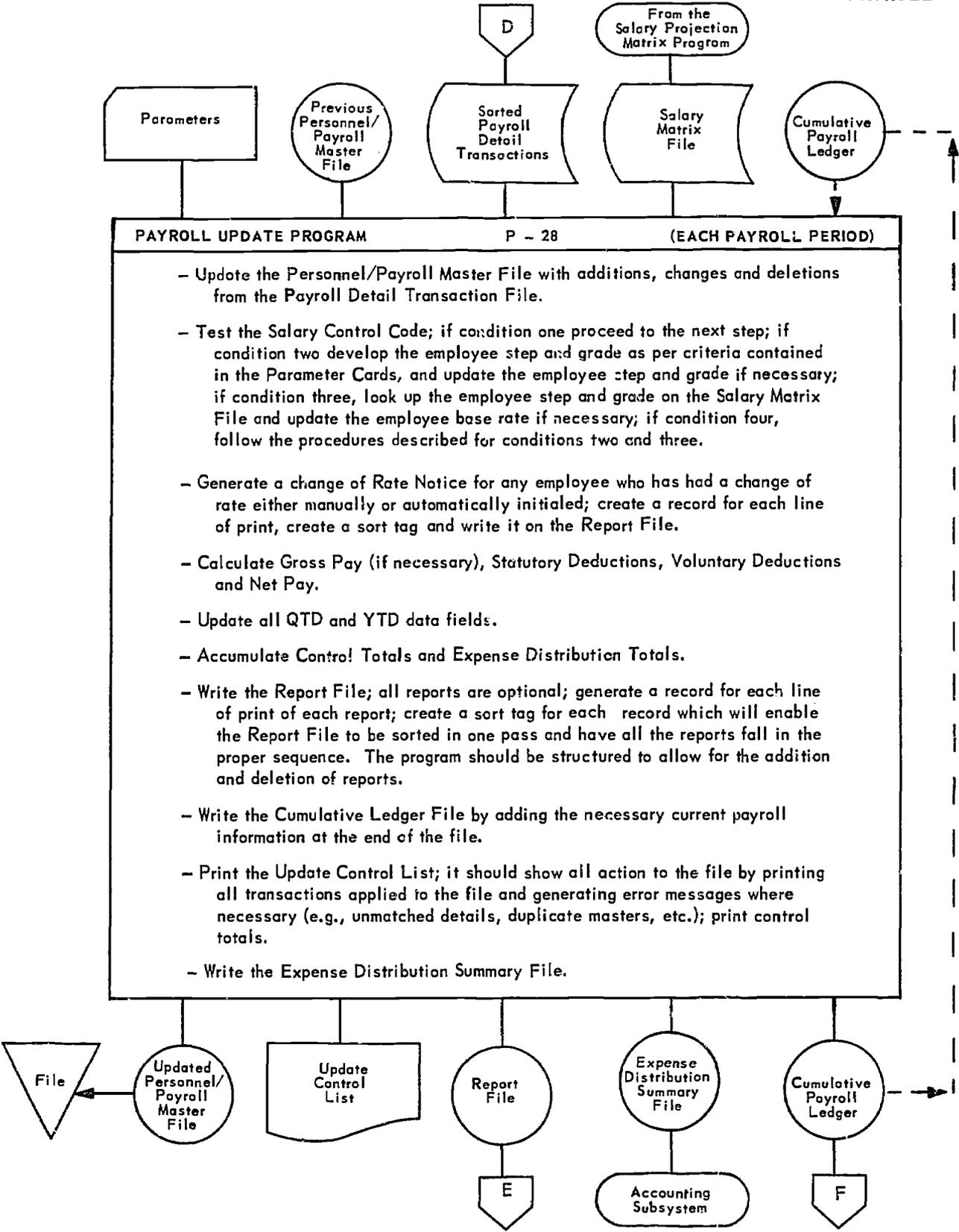


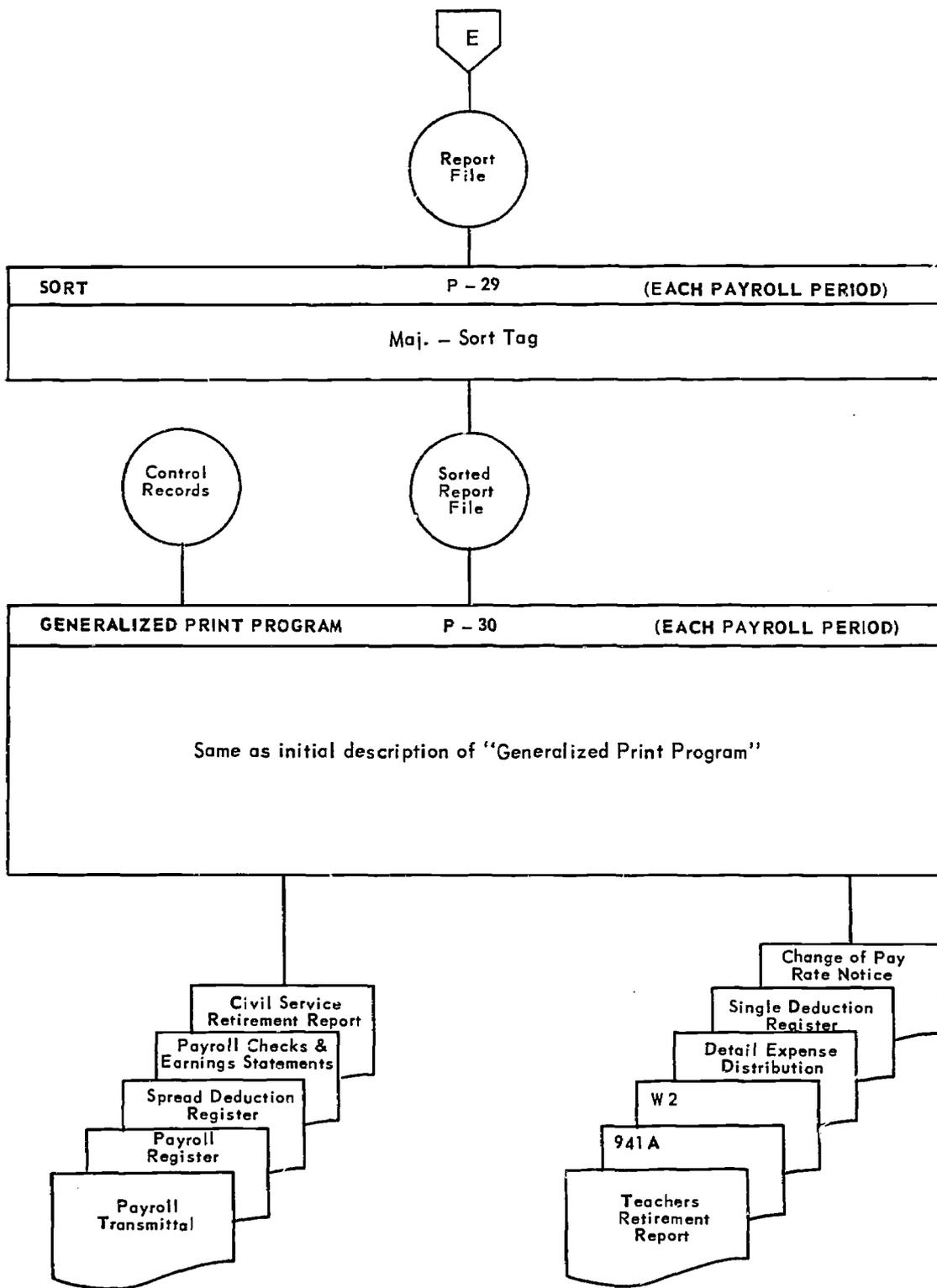
PAYROLL BALANCE/EDIT PROGRAM,CAPTURE OPTION P - 25 (EACH PAYROLL PERIOD)

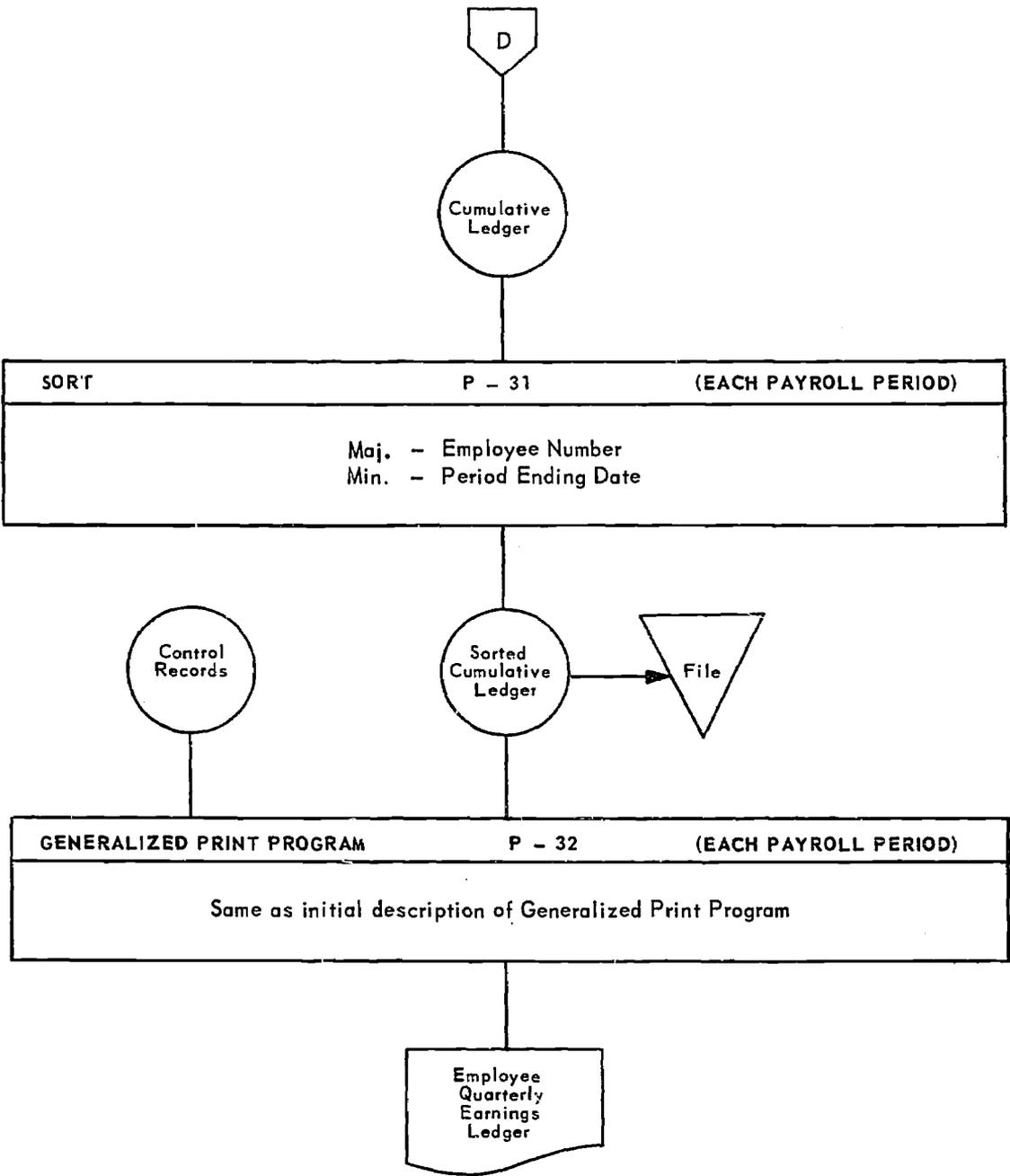
- Calculate the check digit on the employee number for additions and validate it for all other transactions.
- Check all field for invalid characters and missing information.
- Validate all codes by consulting tables.
- Accumulate control totals.
- Write the Payroll Detail Transaction File with each transaction sequentially numbered; flag all records which must be corrected.
- Print the Balance/Edit Control List with control totals; show each transaction with coded error messages, where necessary, indicating where the transaction failed to meet the edit criteria.





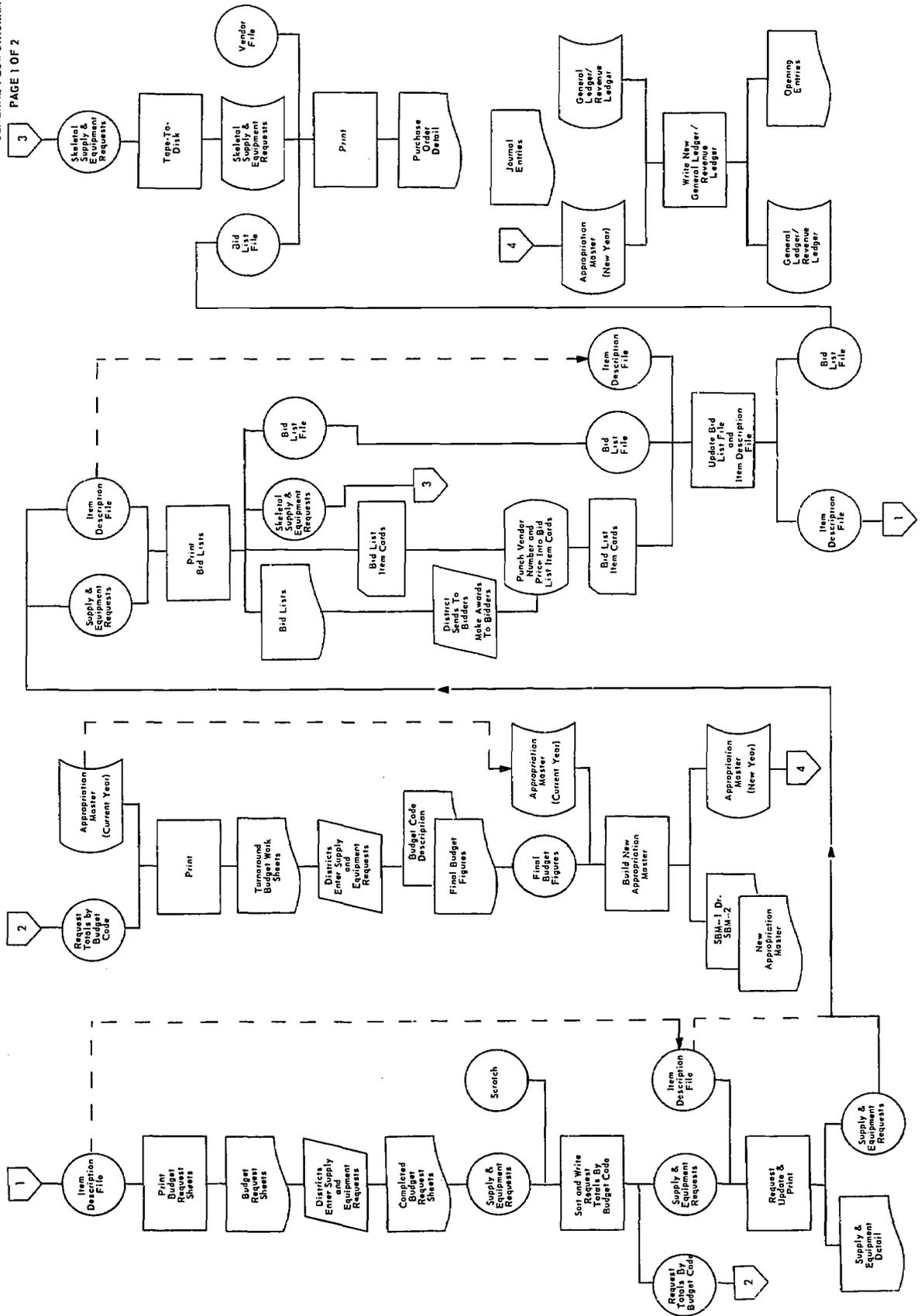




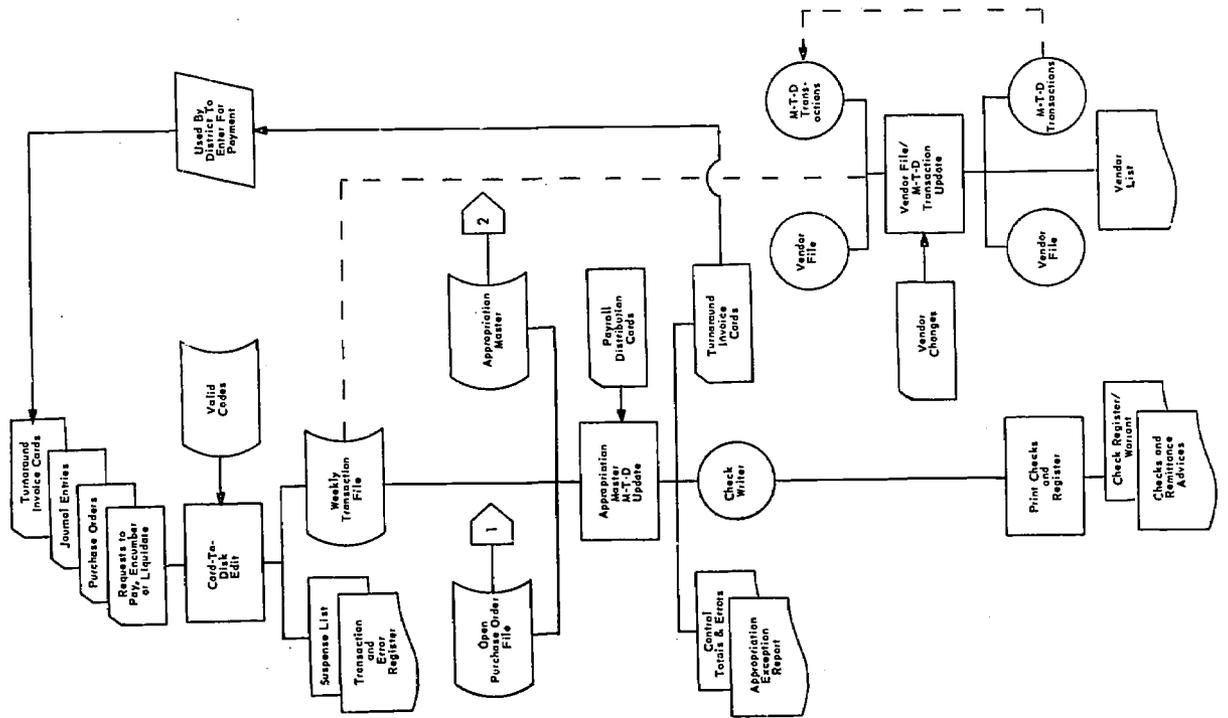
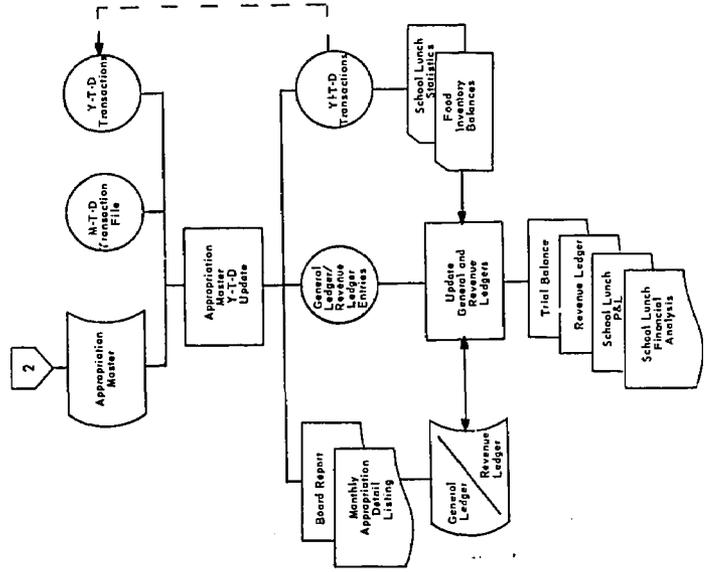
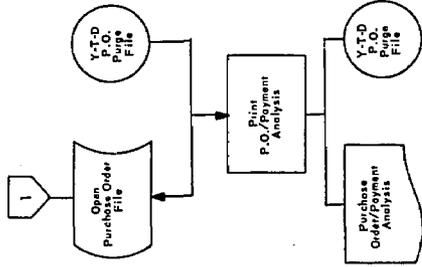


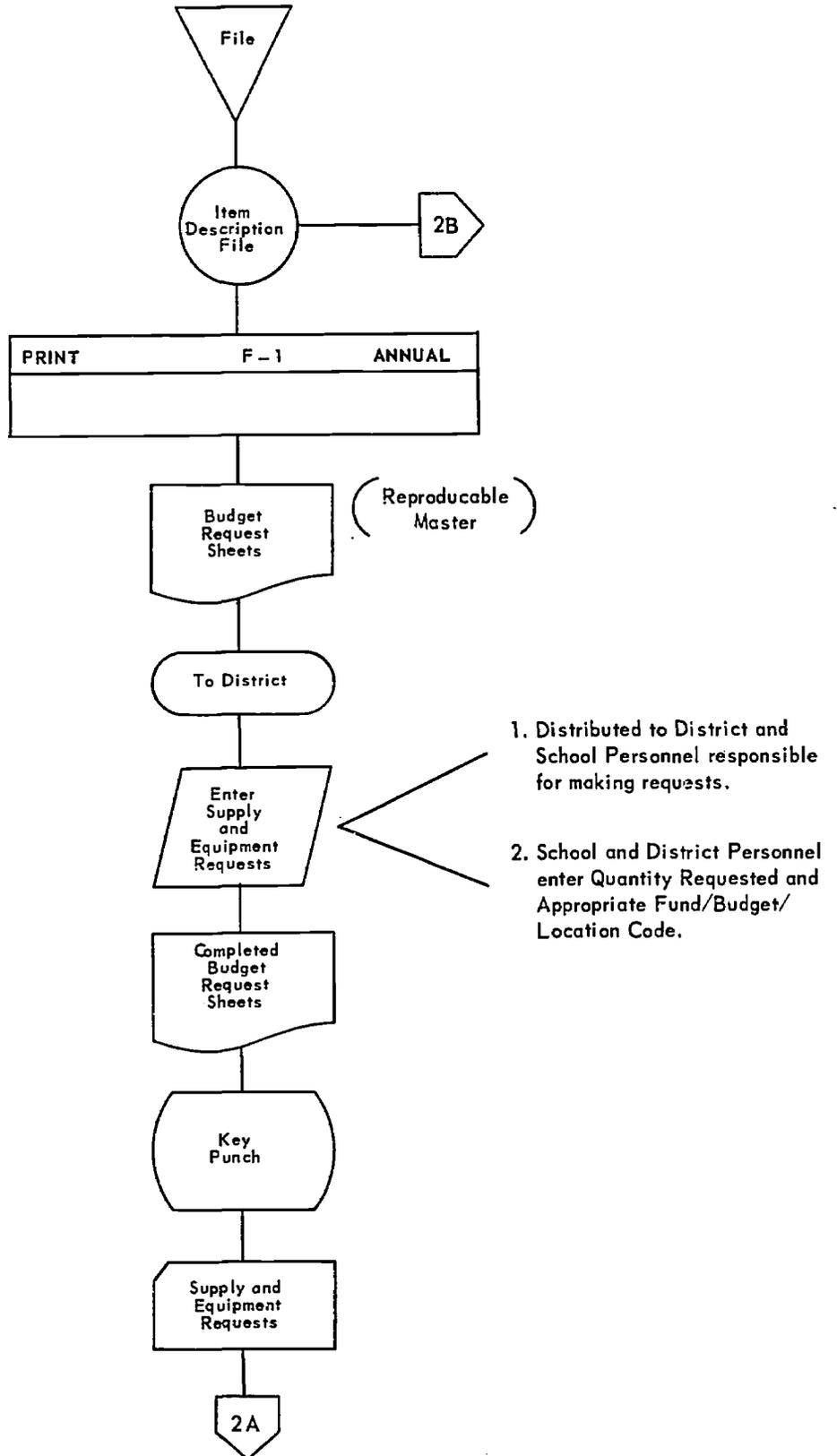
3. Financial Subsystem

- General Flow Diagram
- Processing Flow Charts

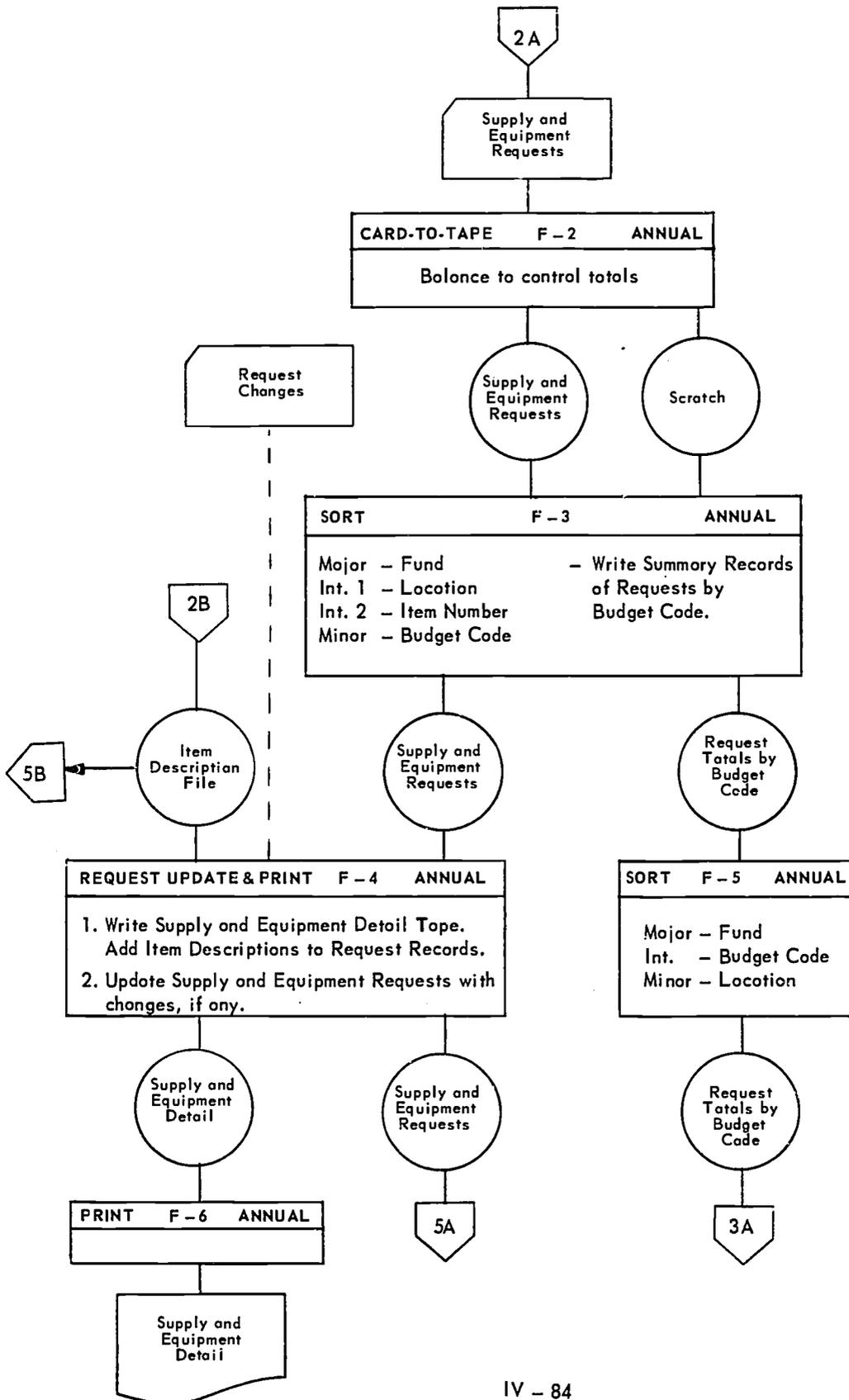


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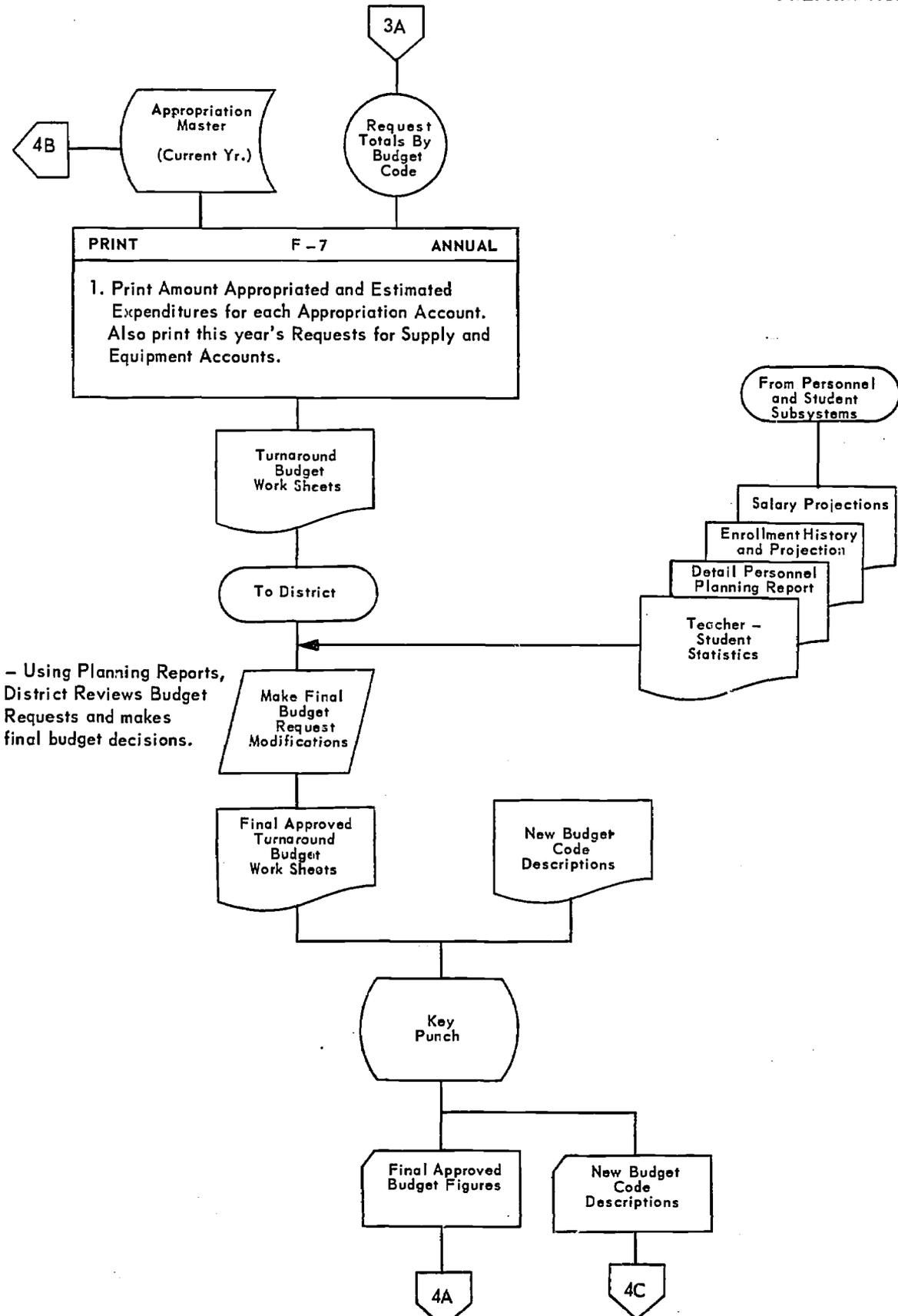




NYSEIS
BUDGET /BID LIST
PREPARATION

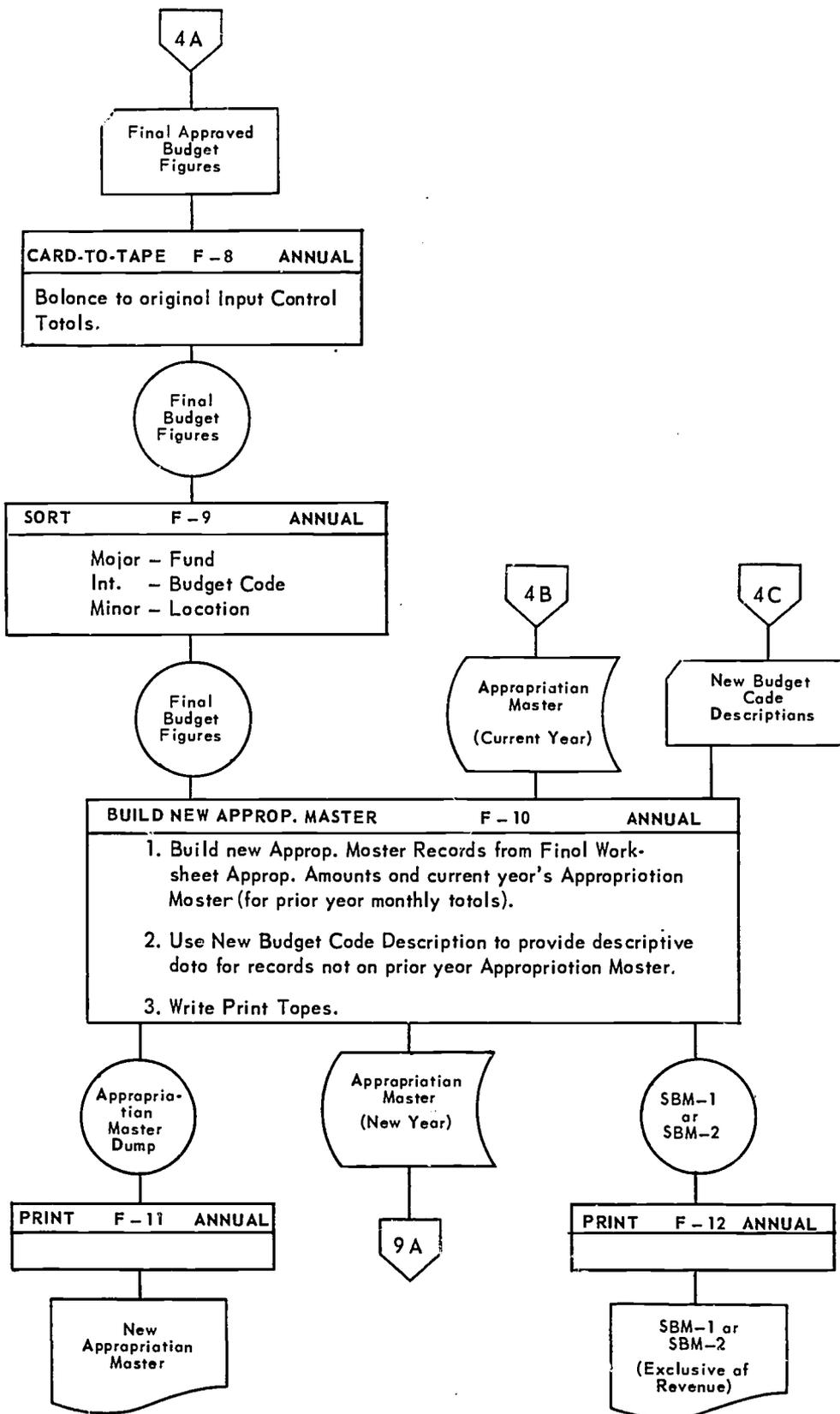


**NYSEIS
BUDGET/BID LIST
PREPARATION**

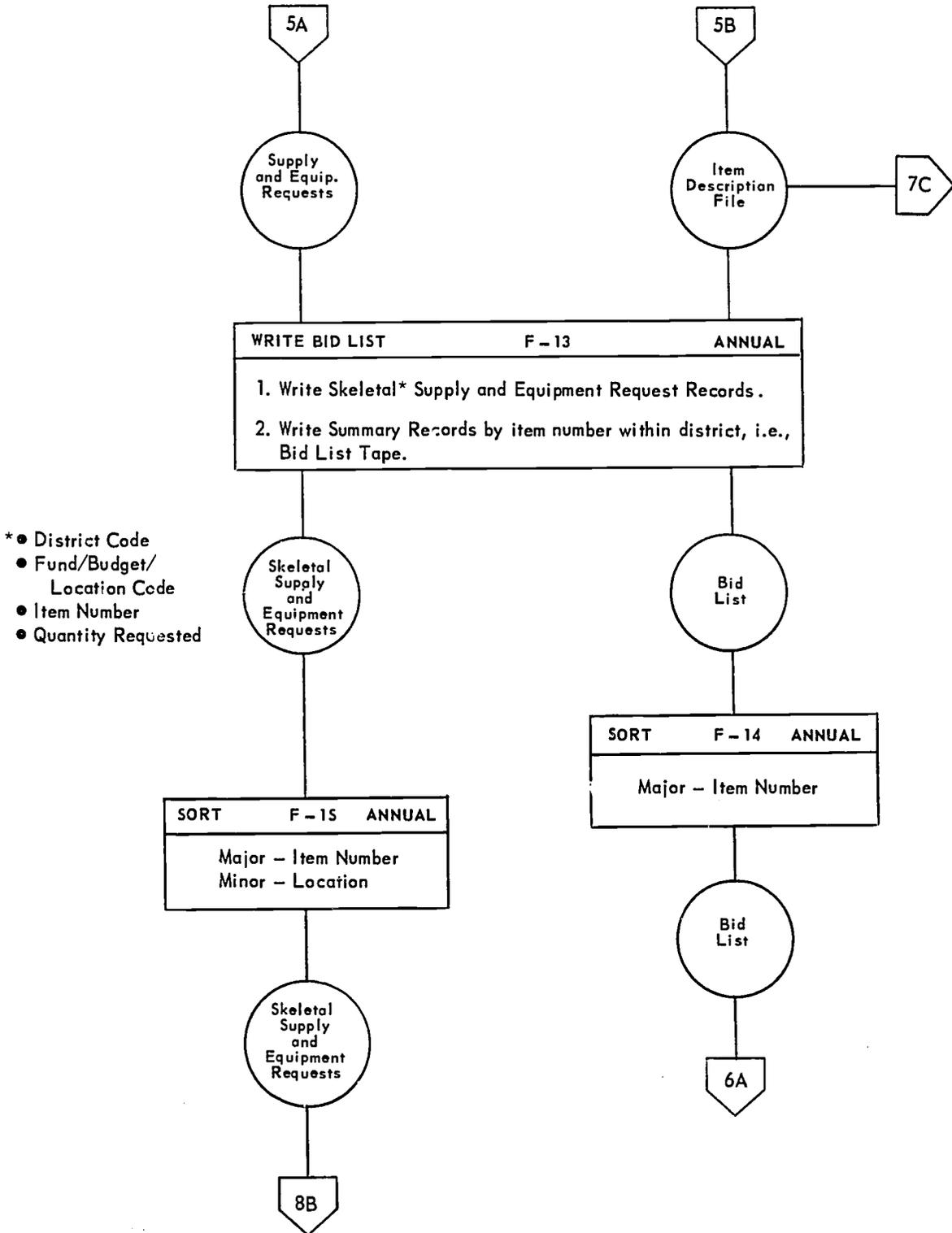


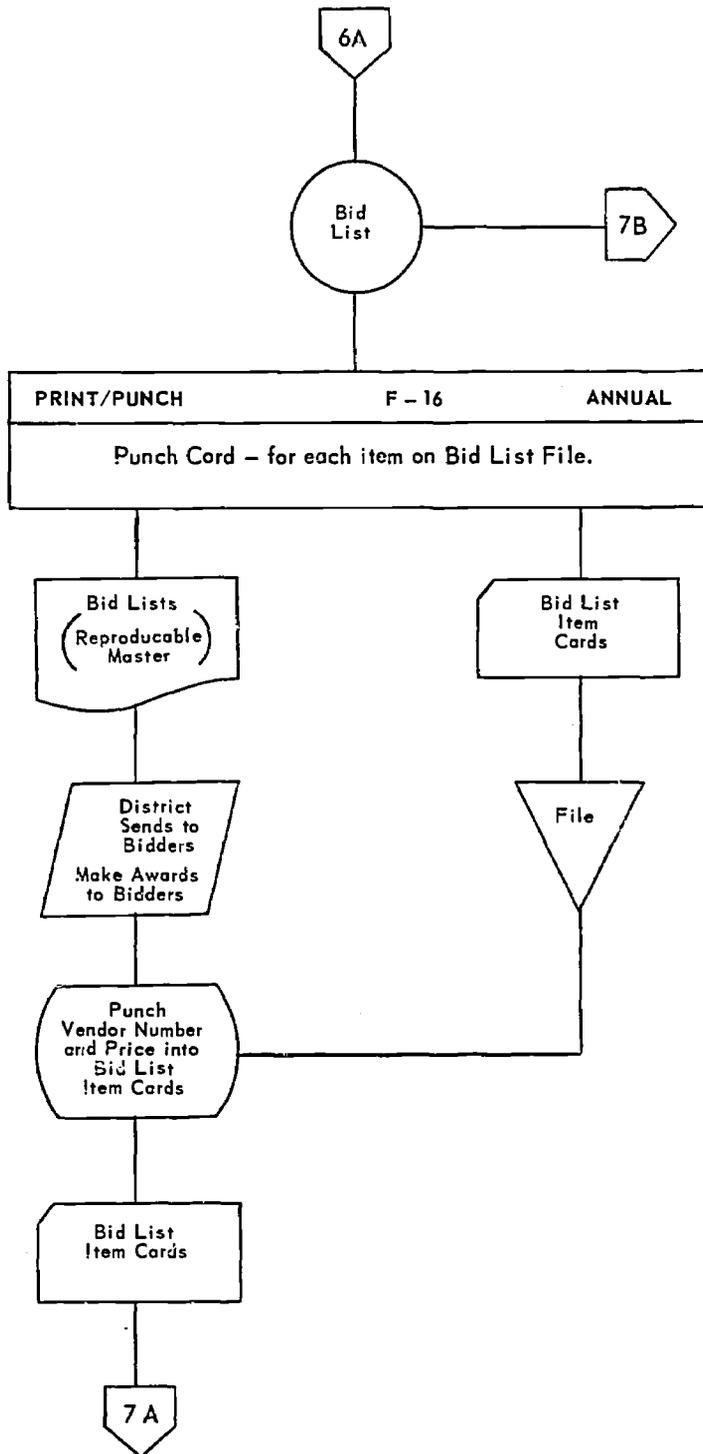
- Using Planning Reports,
District Reviews Budget
Requests and makes
final budget decisions.

**NYSEIS
BUDGET/BID LIST
PREPARATION**

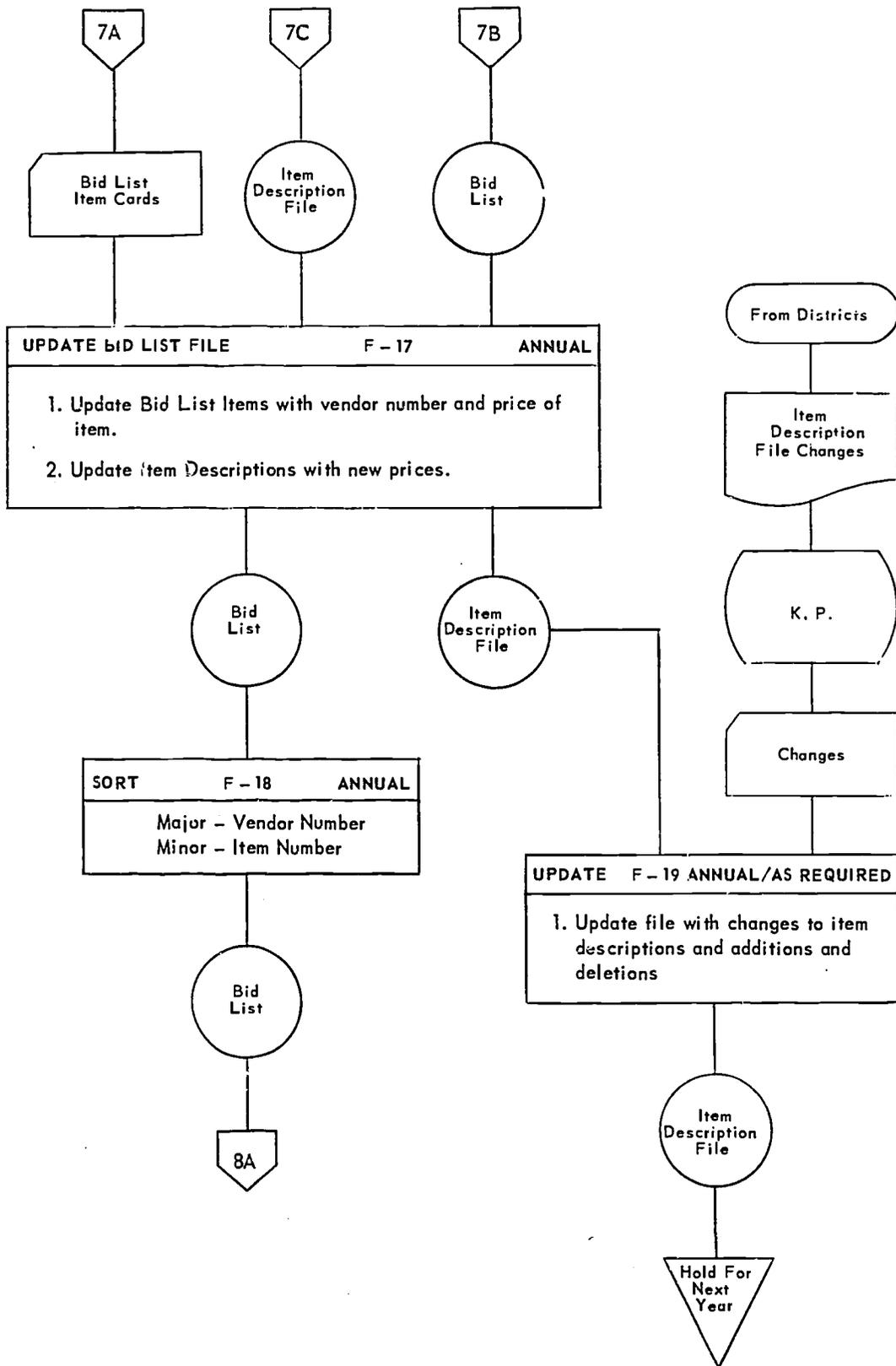


NYSEIS
BUDGET/BID LIST
PREPARATION

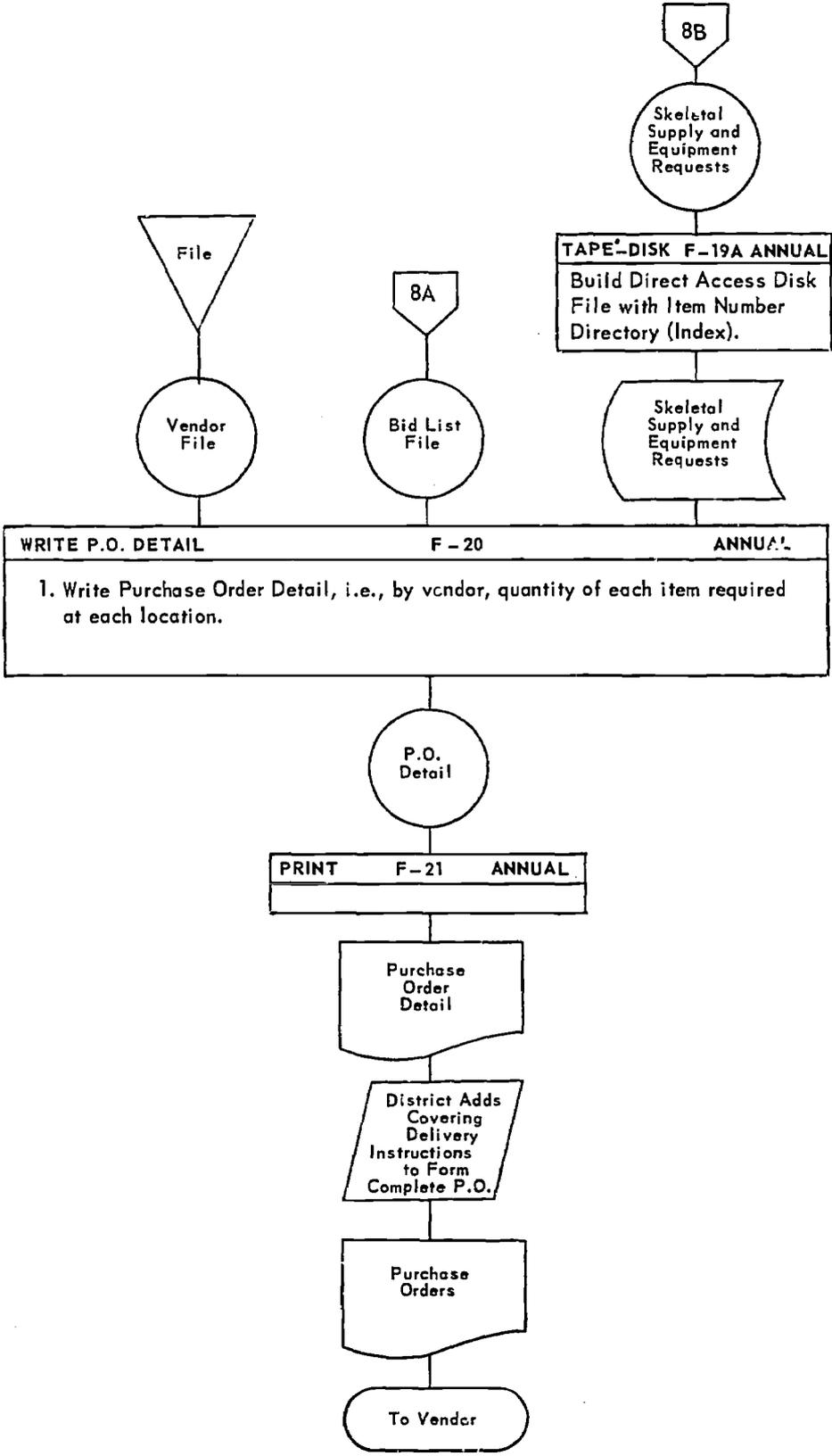




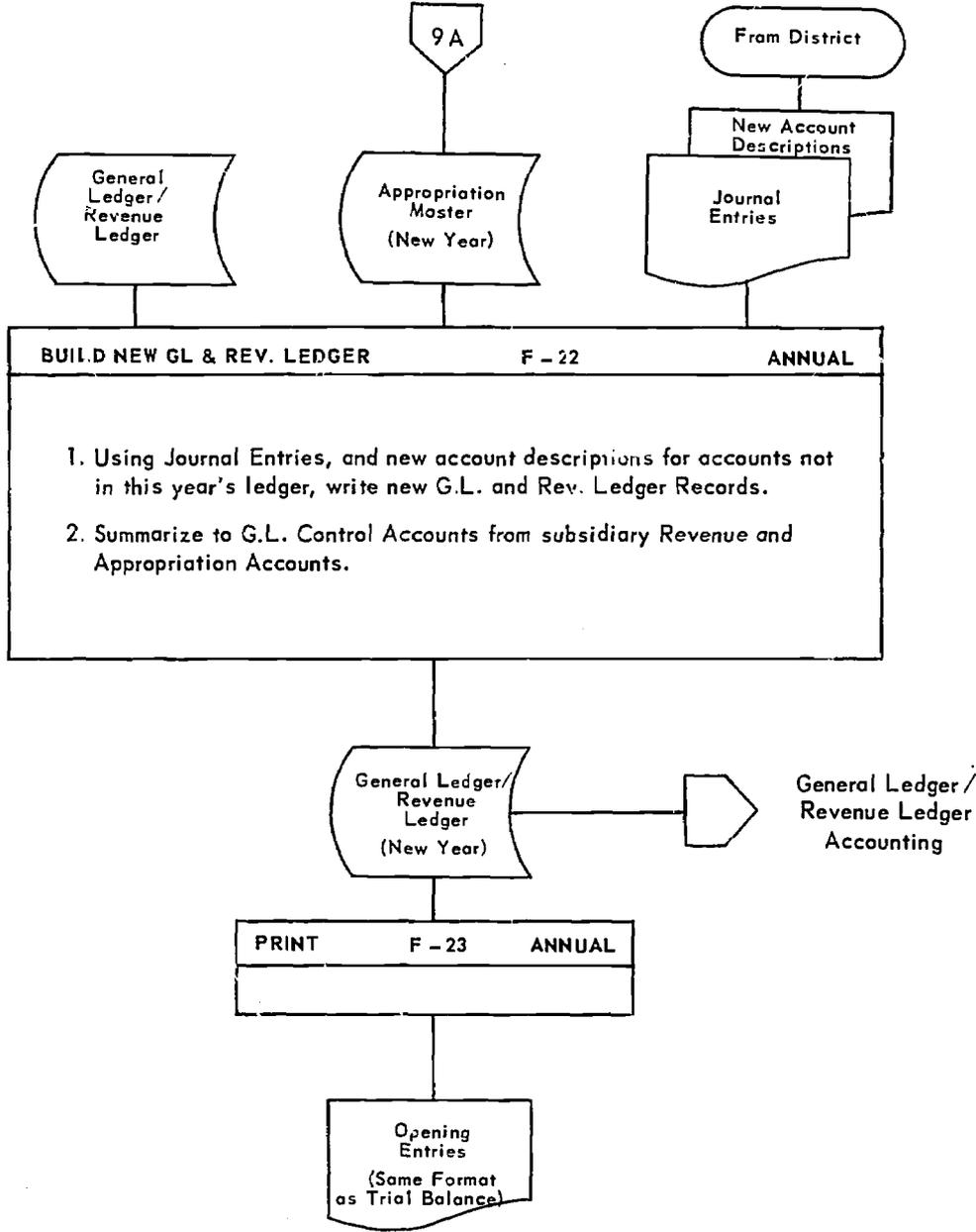
NYSEIS
BUDGET/BID LIST
PREPARATION



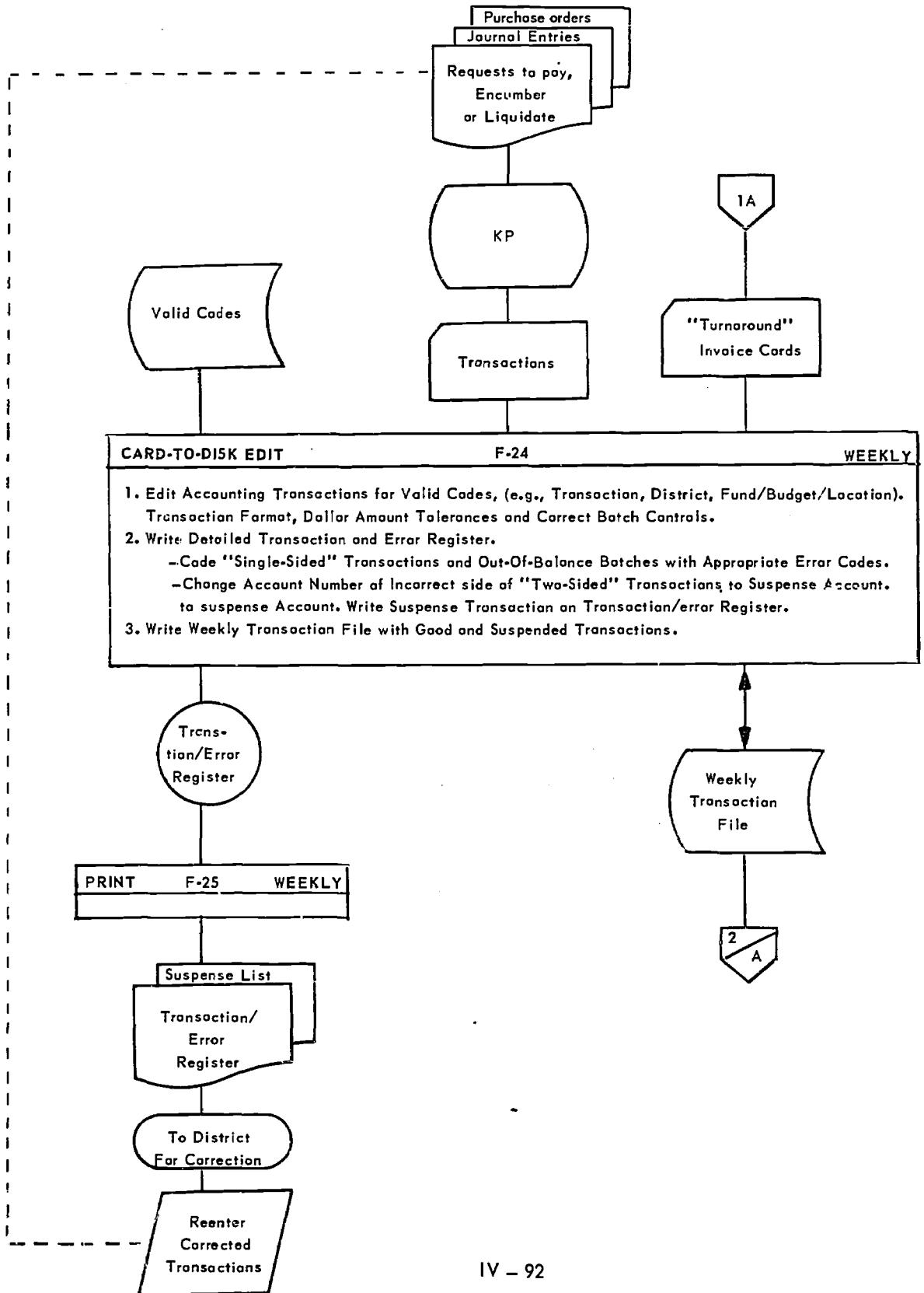
NYSEIS
 BUDGET/BID LIST
 PREPARATION



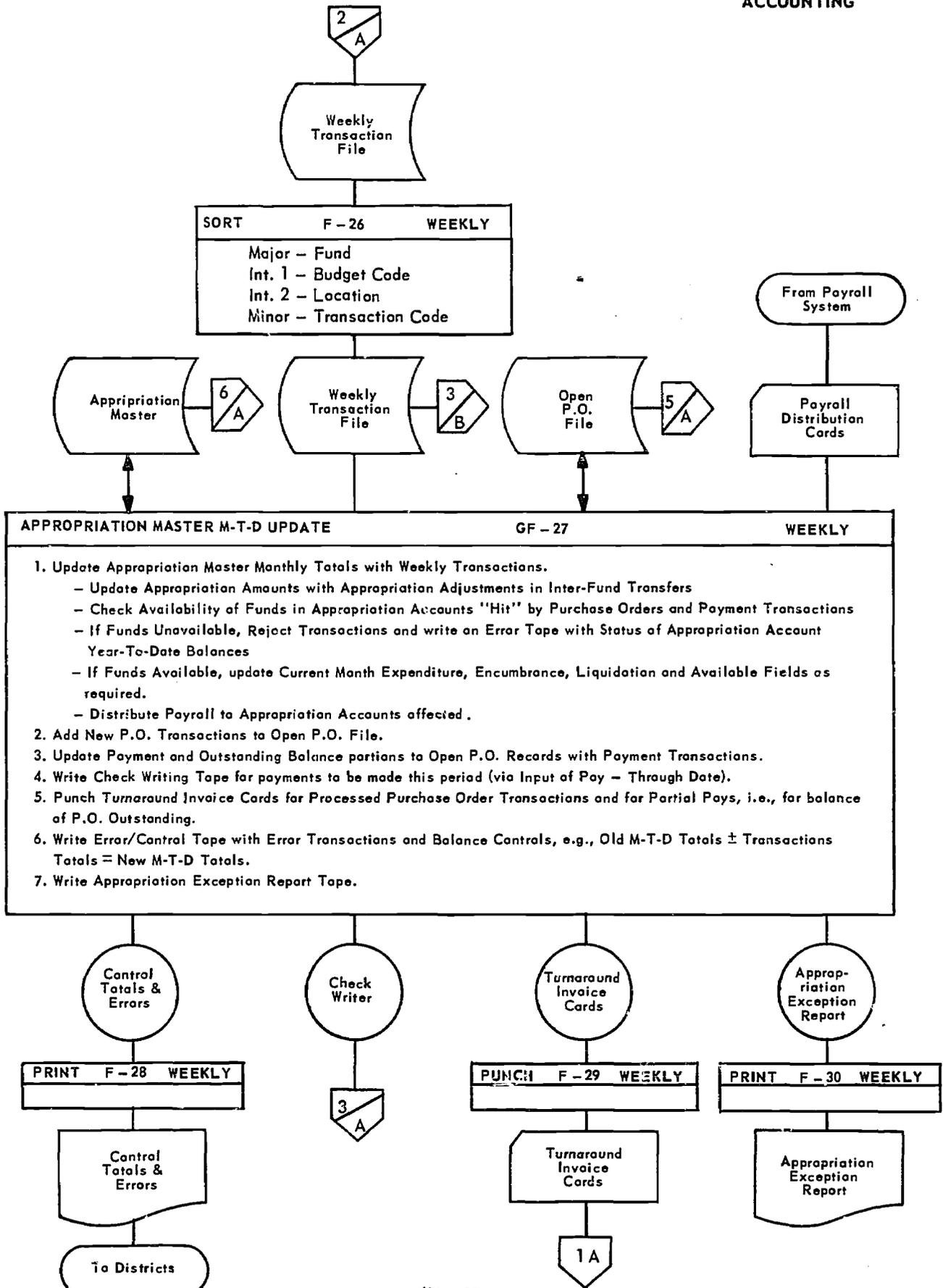
**NYSEIS
BUDGET/BID LIST
PREPARATION**

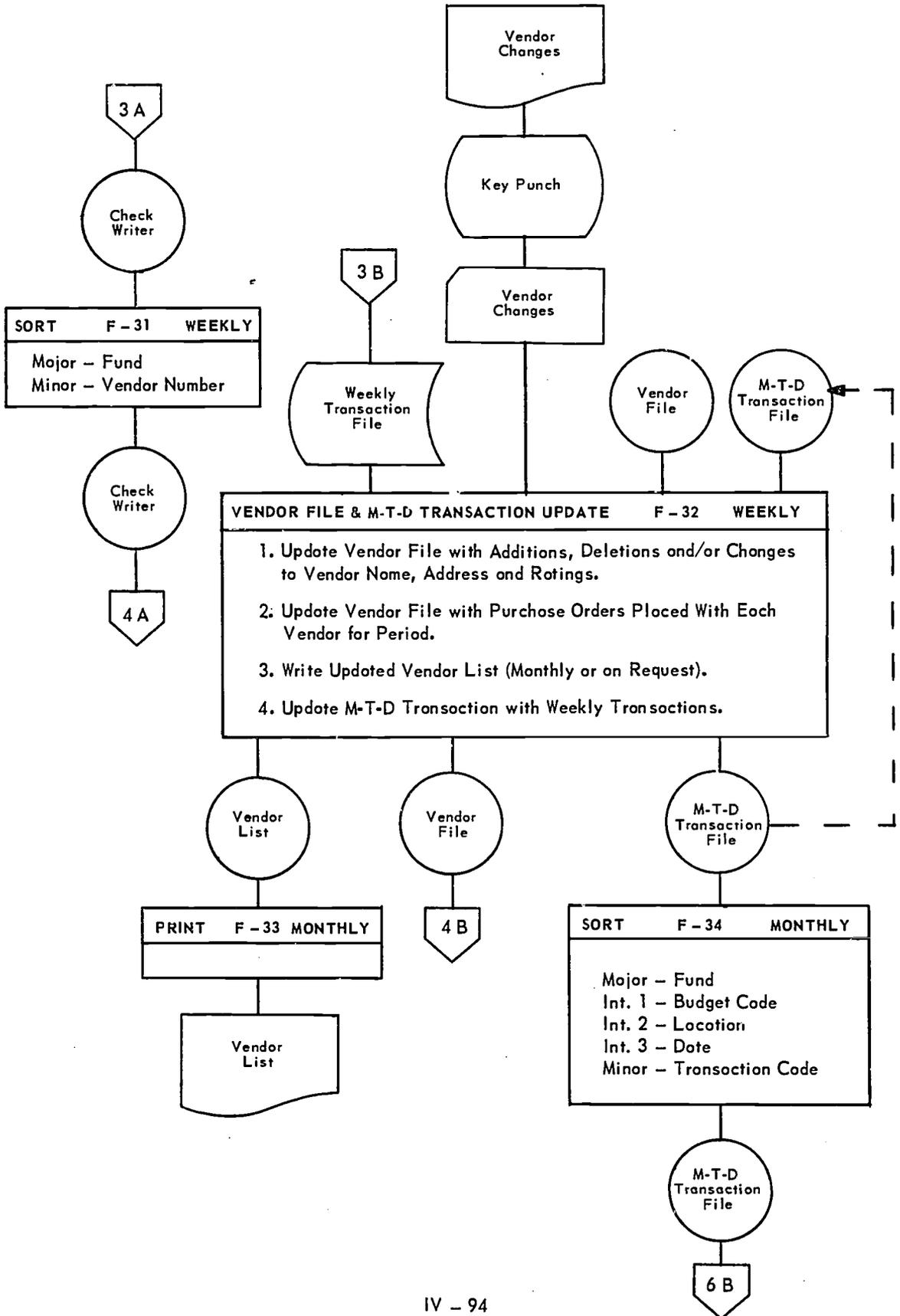


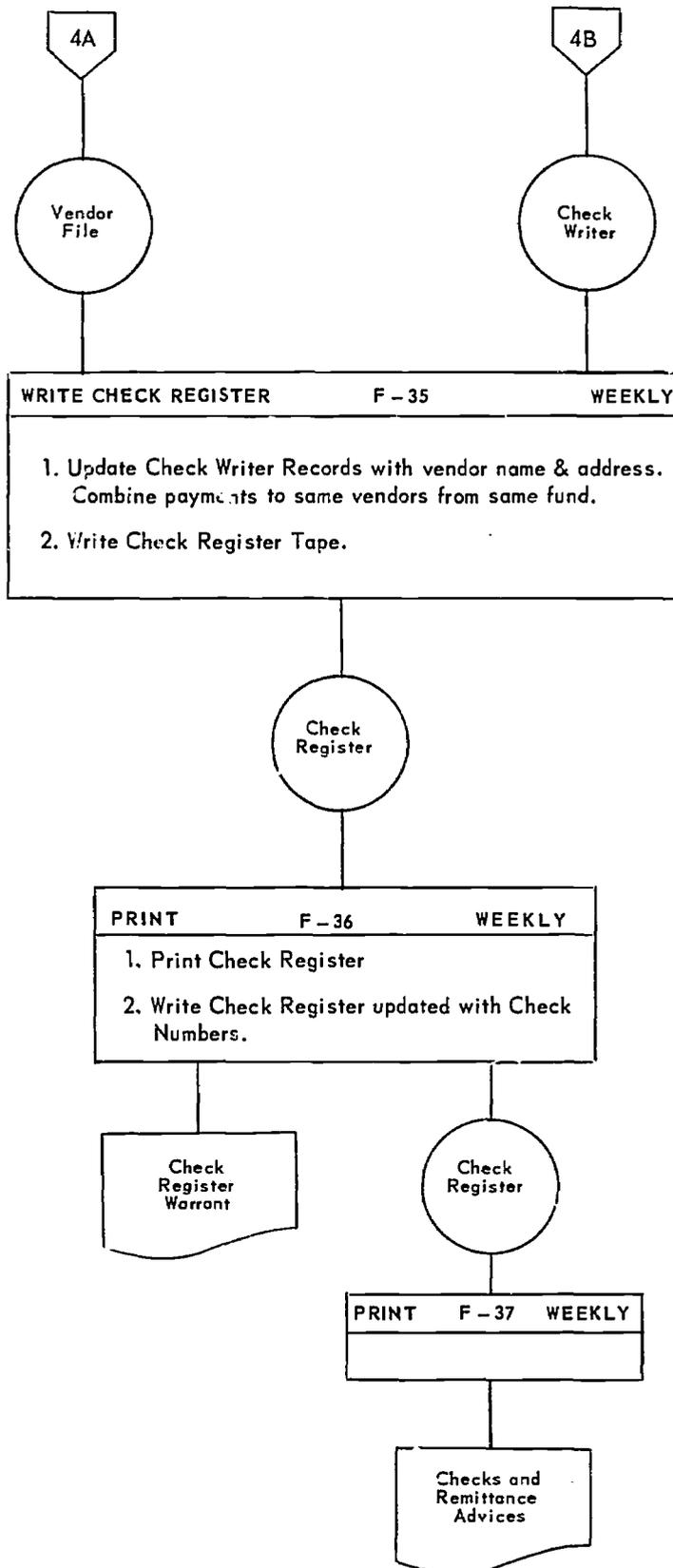
NYSEIS
ENCUMBRANCE
ACCOUNTING

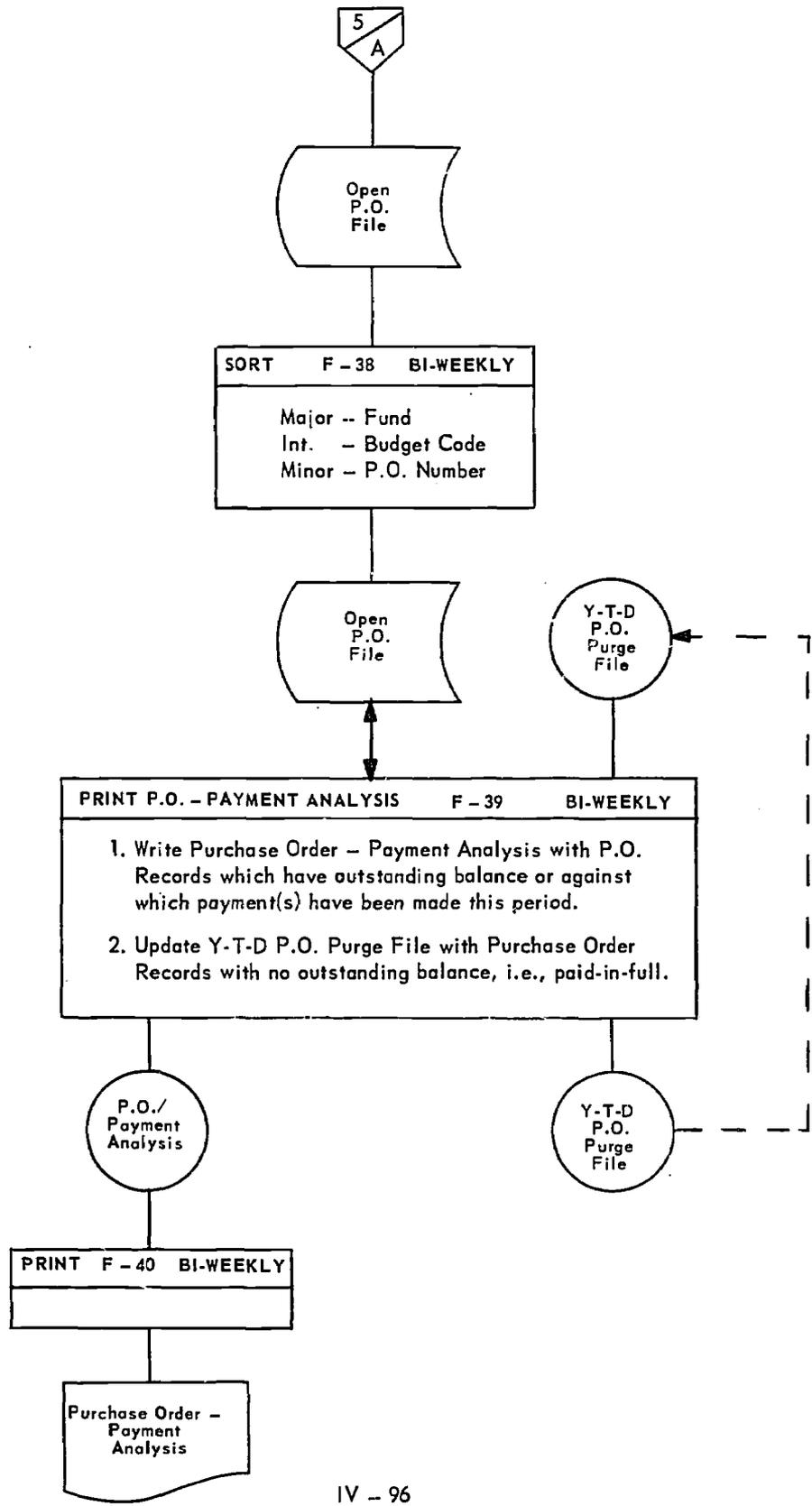


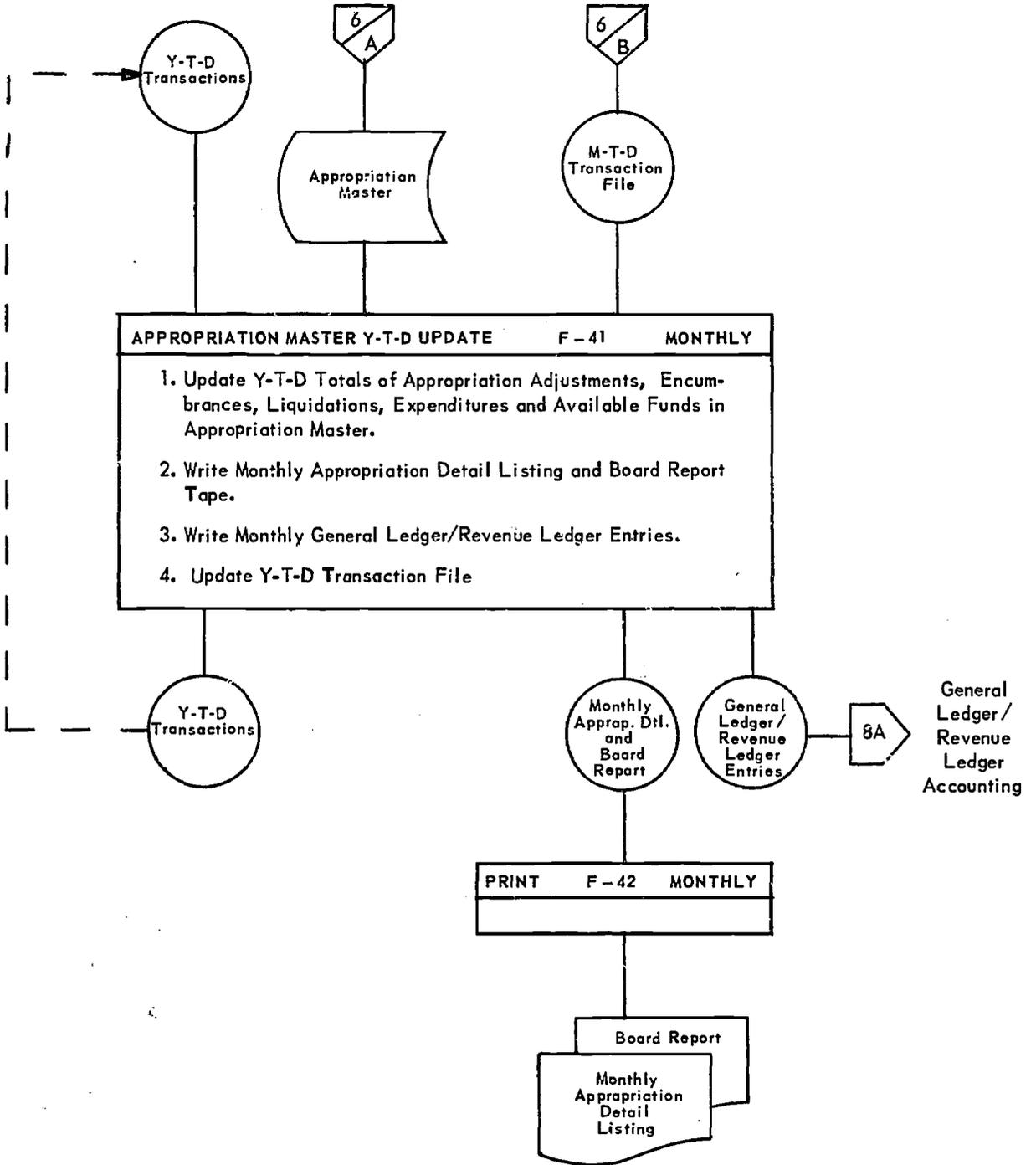
NYSEIS
ENCUMBRANCE
ACCOUNTING



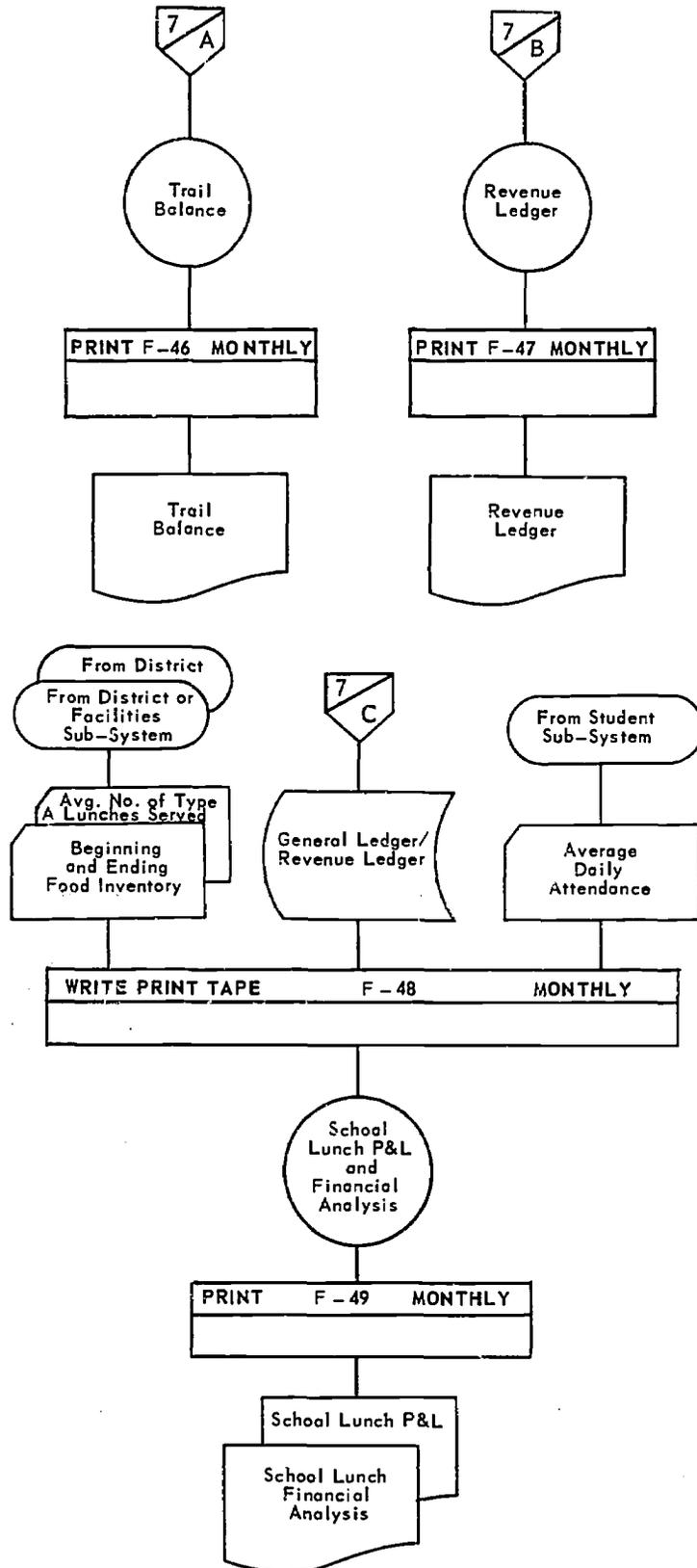








NYSEIS
 GENERAL LEDGER /
 REVENUE LEDGER
 ACCOUNTING



NYSEIS
GENERAL LEDGER/
REVENUE LEDGER
ACCOUNTING

FROM ENCUMBRANCE
ACCOUNTING

